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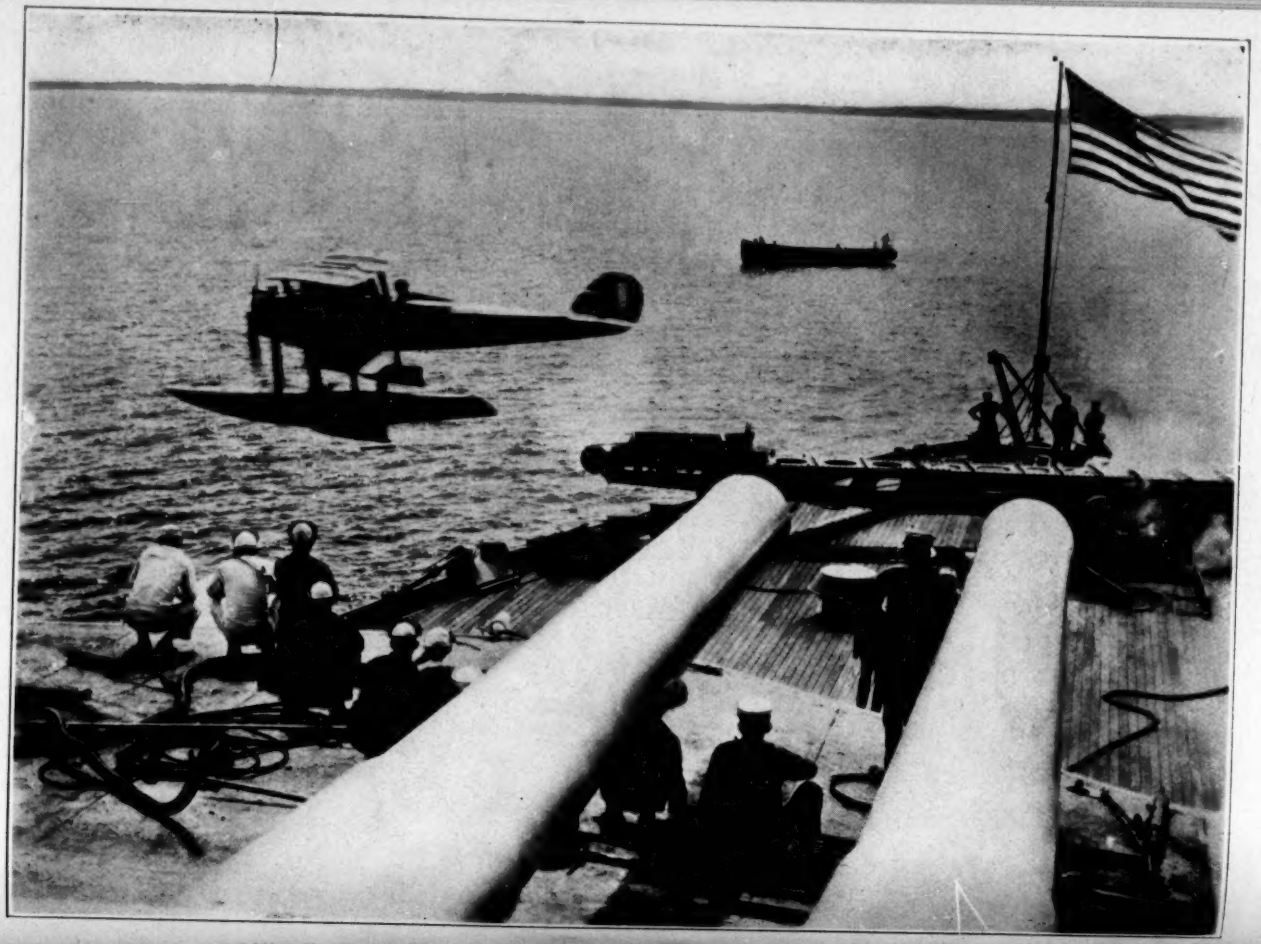

VE-7 Seaplane Leaving Turntable Catapault on U. S. S. "Maryland"

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NAVAL MORALE AFTER WAR

ADDRESS DELIVERED BY
REAR ADMIRAL WM. S. SIMS, U. S. NAVY,
PRESIDENT, NAVAL WAR COLLEGE,
TO THE
GRADUATING CLASS OF 1922

After every considerable war, certainly after every war that has enlisted the passionate energy of all the people, there must inevitably be a period of mental and moral reaction, not only a letting down of the military zeal and enthusiasm fostered by war and national danger, but, most characteristic of all, such a lessening of the people's interest in their national defenses as seems almost to amount to total forgetfulness—not so much of the services rendered by the army and navy during the war, as forgetfulness of the unnecessary sacrifices of valuable lives that have always resulted from our previous lack of preparedness, not to mention the less important, though colossal, financial sacrifices that reasonable preparedness would have prevented.

This is a condition that has confronted us after each of our wars, notably after the Civil War, and we are now called upon to face a similar condition.

We believe that in this matter of public indifference to preparedness we are more unfortunate than any other country. This is doubtless the natural result of our geographical position and

the conditions of our national life. Until recently we have not had to concern ourselves very much with international affairs. We have always been successful in our wars, badly conducted though they have been. We have never had an enemy march in triumph through our capital and force us to pay a heavy indemnity. Our people have never really believed in the possibility of another war, except as a remote contingency.

The inevitable consequence has been, and now is, that once the object of the war is attained, the public loses interest, forgets the sacrifices caused by unpreparedness, and consents to, or does not oppose, such reductions as to keep our forces in a condition of continuous unpreparedness.

We military men keenly realize the depressing effect upon morale of such drastic reduction in our personnel and equipment as will preclude the carrying out of the training which our studies and experience have shown to be necessary to the maximum efficiency. We are all aware that unless discipline and national spirit are of superior quality, unless military men are animated by something higher than the mere habit of mechanical obedience, we shall never be prepared for war, no matter what the number of our ships or the perfection of our matériel.

In what spirit are we, the commissioned officers of the navy, going to meet this situation? We naturally deplore the apathy of the people and what appears to be the unwisdom of the Congress in again exposing us and the country to the possible risk of sacrifices as inevitable and as grievous as those that unpreparedness brought upon us in the Great War. We are naturally inclined to blame the people and our representatives, and let it go at that, disclaiming all responsibility for any resulting inefficiency. But once the final decision is made, it is one of our most important duties to resist this impulse, to accept loyally the conditions imposed upon us by the civil authorities, and to make a careful estimate of the situation with a view to maintaining such units and personnel as are left us in as efficient a condition of instruction, training and equipment as possible; and, more important than all else, of maintaining to the maximum degree the morale of the personnel—the mental state which includes confidence in and loyalty to the navy, and the will to victory.

We should deserve small credit for maintaining efficiency in

a navy provided with everything we could wish for. We have never enjoyed this perfection and we never shall. It is now, and doubtless always will be, our mission to get the maximum efficiency out of inadequate matériel and personnel. This is the normal duty of the American naval officer; and this duty cannot be fulfilled if we begin by being sorry for ourselves.

The present state of the navy is not unique. We are but the heirs of American systematic unpreparedness, the successors of those who have survived much worse conditions—not, to be sure, without a temporary lowering of morale, but who nevertheless "came back" and maintained the discipline and traditions of the service until the next emergency forced the public to consider its naval needs.

Chief Engineer King of our navy, in his book, *War Ships and Navies of the World*, published in 1881, says that "American naval history presents but two or three periods of exceptional activity and importance in war; the long intervals between these epochs have been chiefly marked by gradual decay and general inaction. The several great national emergencies have each called forth most remarkable displays of maritime capabilities and prowess, to be followed, when the crisis was past, by a revulsion to the other extreme of inefficiency and neglect."

Perhaps a brief account of former conditions would best help the naval officers of today to realize how truly fortunate is their condition compared with that which their naval forbears successfully withstood for many years after the Civil War. Even as late as 1880, when I was graduated from the Naval Academy, and for many years afterwards, our navy was in a deplorable state, both as regards matériel and personnel. Generally speaking, it was still a navy of wooden ships and smooth-bore guns, while the navies of Great Britain, France, and many other countries contained many heavily-armored and powerfully-gunned turret vessels.

In April, 1861, we had 34 steam vessels and 39 sailing vessels. By the end of the Civil War, in 1865, we had nearly 700 vessels. Three years later we had 43 vessels, and ten years later still, in 1878, we had but 17, and none of these were of the first-rate.

Chief Engineer King says: "The American Navy is not at present (1880) possessed of a single armored seagoing vessel, and

has strictly but few modern cruising vessels and no armaments of modern rifled guns; in these respects it differs at present from the navies of all considerable European powers."

To the great majority of our officers the ships of 1880 are now but names. The wooden first-raters, *Franklin, Minnesota, Colorado, Wabash,* and *Tennessee,* were of about 5,000 tons, speed 9 knots, and armed with 8-inch, 9-inch, and 11-inch smooth-bores; 12 vessels of second-rate, from 2,000 to 3,000 tons, 9 to 12 knots, were similarly armed. The only armored vessels were 14 monitors displacing about 2,000 tons, with a speed of 6 knots and armed with smooth-bore cannons, and several larger monitors upon which building was suspended.

At this time France had 57 armored ships, from 3,000 to 11,000 tons, speed 12 to 14 knots. Of these ten were first-class ships whose characteristics were quite similar to the battleships of today. They were armed with breech-loading rifles of from 9½ to 13½ inches in calibre, mounted in turrets, half turrets or in barbettes. Italy had 17 equally powerful ships, from 3,000 to 13,000 tons, speed 10 to 16 knots, and 4 of these were armed each with four 100-ton Armstrong guns.

Great Britain had over 50 armored vessels more powerful in the aggregate than those of any two or three nations.

Even the Russian, Austrian, Dutch, and Turkish navies had modern armored ships, armed with rifled cannon.

My first duty at sea was on the old wooden, full-rigged, steam frigate *Tennessee,* flagship of the Atlantic Fleet. Six midshipmen of my class reported on her for duty in the summer of 1880, forty-two years ago, and joined a steerage mess of twenty-two members, quartered in two compartments, each 7 feet wide and 11 feet long. Each of us had a locker for our clothes on the berth deck, and all hands slept in hammocks. The principal military drills were with the smooth-bore guns and in repelling boarders with sword and pike, and were purely perfunctory. The fleet comprised the *Vandalia, Swatara,* and *Ossipee* of about 2,000 tons, and the *Yantic* of 900 tons. The fleet speed was 8 knots. You can imagine what fleet maneuvers were like. The only competition between ships was in sail drill and smartness in sending up topgallantmasts and yards at 8 A. M., and sending them down at sunset. Target practice was then, and for many years after-

wards, considered a nuisance and was a pure farce. The object was to get it over as soon as possible and clean up the mess it made.

These are not exaggerated statements. Upon one occasion, as late as 1901, I witnessed the target practice of a monitor. The greasy smoke of the first shot from one of her turrets covered the object glass of the telescope so completely as totally to obscure the pointer's vision and consequently to arrest the fire, and, incidentally, to enrage the captain, who, upon being informed of the cause of the delay, ordered the firing to be continued just the same; and the remainder of the ammunition allowance was accordingly fired by the turret officer aiming the gun by sighting over a ring bolt on the forward rim of the turret. Of course, no hits were made, but the captain's declared object of returning to port on schedule time was accomplished.

The contrast between vessels of our navy and those of foreign navies was most disheartening. I remember very distinctly the impression made upon our midshipmen when they were allowed, during a practice cruise, to visit the old British broadside ship *Bellerophon*. Though she was then a back number in her own navy, having been launched in 1865 and long since outclassed by many turret and barbette ships, we thought her very wonderful with her 7,500 tons displacement, ten 12-ton guns, 6-inch armor, and 14 knots speed. We realized that she alone could probably defeat our entire Atlantic Fleet.

Under such conditions, all drills and exercises were regarded as necessary drudgery, and there was of course no systematic instruction in the art of war. The few officers who made a study of strategy and tactics and who attempted to convince the service of the necessity of instruction and training in such subjects were decried as impractical theorists and highbrows. The suggestion that a war college be established for so-called practical naval officers was a subject of ridicule, and was vigorously and successfully opposed for many years.

Naturally, the currently expressed sentiment was: "What's the use?" I am sure that only officers who have experienced such conditions can realize their effect upon morale. At that time there was very little of it as we now understand the degree that is necessary to efficiency. It is no wonder that many took to

drink, that many regarded their positions in the navy as a job instead of a trust.

But still the spirit was kept alive by the few who realized that it is men and not ships that count, and who devoted themselves, as well as our resources would permit, to the training and instruction of the personnel. Foremost among these was the forceful man who let nothing discourage him in his efforts to establish this college, Rear Admiral Luce, and who subsequently protected it and successfully maintained it against the assaults of its enemies both inside and outside of the navy.

When we contrast the doleful condition of our navy in 1880 with its present condition, discouraging as that is, we certainly have no reason for self-commiseration.

The military characteristics of our war vessels are now determined only after thorough discussion, by experienced line officers, of the practices of the fleet and the tactical and strategic studies of the Naval War College; and the result is vessels of the various types that in most cases are the equal of any in the world.

Our personnel has just shown in the recent war that its morale was proof against the needless sacrifices caused by ignorance, indecision and mismanagement in Washington.

The navy now has a War College based upon the intellectual freedom of successive groups of student officers to determine the influence of current fleet experience and of new weapons upon the principles and methods of modern warfare.

Officers now understand that serious study is necessary to acquire the knowledge of and training in the art of war that are essential to efficiency; and that no officer can hereafter exercise high command, with the confidence and respect of the service, unless he has attended the course at the college that is maintained for the sole purpose of insuring efficient direction of our navy as a whole.

In so far as concerns the future efficiency of our navy, the mental attitude of our commissioned officers is more important than any other element. The difference between this attitude today and that of forty years ago is really fundamental as regards the necessity of continuous study and training. Formerly, our naval officers honestly believed that their practical seagoing experience was

all that was required to fit them for the efficient conduct of war on any scale. This belief was so firmly rooted that it fostered a feeling of conceit so nearly universal that to attack it was deemed disloyal. Happily there remain but a few of the old guard who still enjoy this very comfortable conviction; thoughtful study and experience have abolished our conceit as a naval characteristic, so that even those who have enjoyed all of our present educational advantages, both of study and experience, fully realize that open-minded and continuous study of the rapidly changing conditions of modern warfare is essential to the maximum efficiency of the individual, and as the maximum success in preparation for war will depend not only upon the direction of the navy as a whole by officers of the highest attainments, but also upon a high average of these qualities in all officers and in all grades, it is clear that it is the duty of each officer to make himself, and those whom it is his privilege to command, as efficient as possible in training and military character. It has been well said that "the soul of the army is the mind of the individual." The same applies, of course, to the navy.

This education of the entire personnel I conceive to be the primary mission to be carried out loyally and cheerfully in the conviction that by so doing we shall not only render our existing forces efficient, but command the respect and confidence of the public until such time as the people themselves have come to realize that what we naval officers call our navy is really their navy, of which we are a part—to realize the importance of keeping it prepared for war, and to understand the uselessness of a navy that is not continuously so prepared.

We may be sure that in time the increasing interest of the people in international affairs will bring them to a clearer understanding of our national needs in this respect. Henderson says:

> The importance, nay the necessity, that the people, as a governing body, should keep as watchful an eye on its armed forces and the national defenses as on diplomacy or legislation is fully realized, naturally enough, only by those nations whose instincts of self-preservation, by reason of the configuration of their frontiers or their political situation, are strongly developed. Yet even to maritime empires, to Great Britain or indeed to the United States, an efficient army is of the first necessity. . .

and this applies all the more strongly to the navy—our first line of defense in war and in diplomacy.

Unfortunately, as yet the people know all too little about naval affairs and national defense, though they have taken more interest in these subjects in recent years than ever before, as has been plainly indicated by their effective opposition to the proposed drastic reduction in naval personnel; and naval officers should take advantage of this interest by responding to the numerous invitations to address clubs, forums, and societies on naval subjects.

In the above remarks I have attempted to make clear that our present situation is vastly more advantageous than at any former time after a war; and I have outlined what I understand to be our duty as naval officers in the premises. As, however, I am of course conscious of the degree of honor likely to be accorded a prophet in his own navy, I believe it will be to our advantage to consider this matter from the point of view of an experienced Congressman who is very sympathetically in favor of adequate military preparedness.

Representative Frank L. Greene, of Vermont, a member of the House Military Committee, has published his impressions of the situation that will confront the army, and his advice to its officers, if the commissioned and enlisted personnel is reduced below the number considered necessary by the War Department. I believe there is no doubt that Mr. Greene's concern for adequate national defense is such that his interest in preparedness is as keen for the navy as for the army. At all events, the advice he gives the officers of the army, based upon his extended experience as a legislator and upon his knowledge of the influences governing the Congress, is equally valuable and equally encouraging to the officers of the navy.

His analysis of the duty of army officers in the present situation appears to me so reasonable, so appreciative of the military officer's concern for adequate preparedness, and so sympathetically considerate of the effect upon them of the people's apparent forgetfulness, now that the danger is passed and the war services of the army and navy are no longer actually required, that I make no apology for quoting at length Mr. Greene's cheering advice, which is as follows:

> As a matter of practice I do not like to anticipate congressional action by any attempts at prophecy in public or by any anticipatory criticism

of anything of the kind. However, I am not at all averse to expressing my judgment as to what it might well become the army to do under the circumstances, and inasmuch as I do not need to assure you of my warm friendly concern in the army's welfare, I do not hesitate to venture a few suggestions.

In the first place, when all is said and done, this country may count itself lucky that it has not shared more deeply in the general popular reaction that has all over the world followed the Great War. We are lucky indeed that the "let-down" of tense nerves and strained minds and wearied flesh has not precipitated us into troubles even more serious than those we now experience.

Whatever may be the psychological aspects of the business, whatever may be the true situation with regard to this, that or the other phase of it, we are quite certain of one prominent fact and there is no possible escape from it—and that is that the government as well as the people must economize for several years to come, and economize in something more than a perfunctory fashion, too. No matter how we turn or with what argument, to face this or that condition or to question the responsibility for this or that condition, this one sober fact stares us in the face at every move—we must economize.

Now, of course it is always true that economy should be observed with good sense and discretion and that there is such a thing as overdoing it and ruining the very agency that one might otherwise hope to save. It is true that misdirected economy is often destructive or at least weakening of agencies and institutions that should be preserved in life and activity.

I can understand with very sympathetic interest how the War Department and the army literally shiver at the prospect of having to undergo such radical and drastic treatment at the hands of congressional economists that the very heart and hope are cut out of the plans for the national defense and of the training of soldiers and citizens for the national defense that are the result of years of study and the hard-bought lessons of experience on the battlefield. I know it is discouraging.

Of course there is a jar to the high-tensioned, high-purposed professional mind in all this. There is a dread of ruthless assault upon ideals, practical ideals, and much of that kind that is something more than merely discouraging to professional ambition.

There is also, and this is more important, the deep sense of injury to a very vital governmental policy, a policy that has been learned through nearly a century and a half of cruel and bitter experience in wars. The army naturally feels that it is a custodian of that experience and should be held in confidence and trust as a great instrument that is to conserve that experience, profit by its teachings, and be responsible to the people at any time for the state of preparation for defense of the nation in any crisis.

But I would say to the army at this time that it can only be held responsible for that degree of preparation for national defense that the congressional policy and appropriations will permit.

After we have each in our several spheres made the best argument we can why economy should not go beyond a certain point, we must all prepare ourselves in whatever agency of the government we may be situated, for a period of enforced and rather drastic economy, after all. There is no use trying to reason out of it or to give any excuse why one should not be included in it. It is a condition and not a theory, in all the significance of that much used phrase. Economy is going to be applied to every agency and institution of this government. Perhaps in many respects Congress may be persuaded to make all those economies reasonable. But in any event, those agencies and institutions that accept that policy with a smile and make the best of the circumstances are most likely to emerge at the end of that period with something like that degree of popular and congressional confidence that may make their path smoother thereafter.

That is about all I have in mind to say just now. I think the army will be very, very wise if it takes its medicine with a grin, buckles down to work, makes the best it can of a hard situation, summons all the philosophy of Mark Tapley to its aid, breathes cheerfulness and hope and loyalty and good faith constantly in all its relations with the government and the people, tightens up its belt, and works hopefully for the dawn of a brighter day.

There is bound to be a reaction following this wave of economy. There is bound to come a time when harsh and drastic measures of economy must cease or they will become destructive, and there is bound to come a time when the people themselves, no longer over-influenced by those who are trying for unreasonable economies, will come into the realization of their own power and the necessity for its use and simply put the radical and unreasonable economists out of business.

This country is going to have an army and it is going to be along the general lines laid down in the amended National Defense Act of June 4, 1920, and the public is going to support that idea when the public more thoroughly understands it, and, may I say, when the public gets more and more closely and familiarly in touch and understanding of its own army and its own army people.

For my part, I think it would be a wise thing if the army went quietly about its business for the next few years, sought every proper means of showing its own inherent worth, both to government and the people, cleaned its house wherever necessary, both in personnel and in customs, and then found itself ready to take advantage of the turn of the tide. And the tide will surely turn.

That, surely, is advice upon the wisdom of which we may rely in all confidence—the advice of a friend in the Congress who has a unique understanding both of the conditions that confront us and the manner and spirit in which they should be met; that is, philosophically to accept the conditions as we find them; get

down to work and make the best of the material situation, redouble our efforts in training, in instruction and in the development of military character; and through it all remain cheerful pending the time when, as Mr. Greene says: "the people themselves, no longer over-influenced by those who are trying for unreasonable economies, will come into a realization of their own power and the necessity for its use and simply put the unreasonable economists out of business."

Let nothing in this paper be construed as implying any lack of confidence in the ability of our personnel to stand up under even more trying conditions than the present. My object in writing it is chiefly to present a brief review of our navy's much more serious troubles in the past, from the point of view of one who has actually experienced them, and to contrast these former trials with those of the present in order to make it clear that the worst is not yet to come; that never again can we reach such a low ebb in intellectual or material development; that never again shall the service be arrayed against the study of the art of war; that never again shall our navy build ships whose designs violate both military requirements and common sense; that the life blood of the navy is its personnel; that its soul is the mind of the individual; and that the people may rely upon us to keep that mind at all times in such a condition of training and morale as to make the best of any material conditions that may be imposed upon us.

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TORPEDO PLANE AND BOMBER

By Rear Admiral Bradley A. Fiske, U. S. Navy

The bombing experiments that were conducted last summer off the Capes of the Chesapeake, the success that attended them, and the world-wide publicity that was given, added to the fact that the torpedo plane was not tried in the experiments at all, have inclined many people to infer that the torpedo plane has been declared a failure, and relegated to the classic shades of limbo.

Many officers, however, though they realize the importance of the bomber, think that the torpedo plane is at least equally effective. Their reasons are based on the following beliefs:

1. A belief that (by night or by day) the chance of hitting with a torpedo is greater than that of hitting with a bomb, the distance, of course, being the same.

2. A belief that the damage done by a torpedo, when it hits, will be as great as the damage done by a bomb of equal weight, when it hits, or falls alongside.

3. A belief that (by night or by day) it is easier to hit a bomber with anti-aircraft guns when it reaches its firing position than to hit a torpedo plane when it reaches its firing position, the distances being the same.

4. A belief that (by night or by day) it is easier to prevent a bomber from getting a good aim than to prevent a torpedo plane from doing so, the distances being the same.

Taking these items in succession:

1. A long theoretical argument can be made to prove that there is a greater probability of hitting with a torpedo than with a bomb: based largely on the fact that the torpedo runs at a constant depth. It seems more convincing, however, to point out that the percentage of hits in the bombing experiments last summer was considerably less than the percentage of hits actually

made by torpedo planes in recent practices, although the distances from the target were less in the bombing experiments than in the torpedo plane experiments.

Before leaving this aspect of the question, I beg leave to remind the reader that a detailed statement appeared in certain important British papers (and was never denied to my knowledge) that, in the latter part of 1919, a squadron of eight British torpedo planes, under cover of a smoke screen made by two bombers that preceded them, made a simulated attack on a British fleet in Portland Harbor and scored six hits with dummy torpedoes! Seventy-five per cent hits.

2. As to the relative amounts of damage done, we may disregard attacks of small bombs dropped on vessels; because, although such attacks will be very formidable, they will probably not constitute major attacks, but rather minor attacks intended to demoralize the personnel, preliminary to major attacks by large bombs and torpedoes.

Probably no officer would question the declaration that the detonation of a torpedo in actual contact with the hull would do more damage of a purely local character (that it would cause greater actual penetration of the hull) than the explosion of a much larger amount of explosive a few feet away. Assuming the charge in a 1,600-pound bomb to be four times as great as that in a 1,600-pound torpedo, and the center of the charge of the torpedo to be a foot away from the hull, the penetrating effect of the bomb would be about the same, if the center of the bomb were two feet from the hull. Unless the bomb fell not more than two feet away, therefore, the torpedo would have the greater penetrative effect.

If there were no other effect to be considered, therefore, we should feel safe in declaring that a torpedo hit would, in nearly every case, be more effective than the explosion of a bomb, unless the bomb fell not more than two feet away. But the case is not so simple as this; for the reason that, besides the actual penetrative effect, there is a sort of water-hammer effect, which causes a great pressure over a considerable area, and does a damage in opening seams, etc., which varies with the charge, distance from hull, depth of immersion, strength of structure, etc., etc., etc. So complicated is the question, that no one yet has seemed quite able

to reach a decided opinion as to the relative damages done by a torpedo that hits the hull, and a bomb that explodes near the hull. That a torpedo plane can sink a first-class superdreadnought is apparently the opinion of Mr. Hector C. Bywater, who stated in the *Naval and Military Record*, of February 16, 1921, "Last week she (the German superdreadnought *Baden)* was bombarded at short range by gunfire, and afterwards attacked by torpedo planes; with the result that she now lies on the bottom of Spithead in shallow water, where she can be salved for further tests."

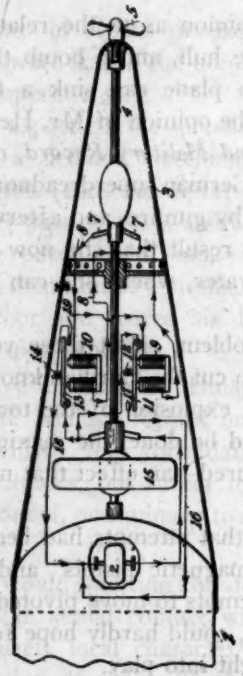
In studying this problem, about three years ago, I concluded that it would be best to cut the Gordian knot, and devise a scheme that would ensure the explosion of the torpedo directly beneath the ship. If this could be done, the maximum effect of the detonation would be secured—an effect that no ship whatever could withstand.

I knew, of course, that attempts had been made to do this by means of so-called "magnetic pistols" and similar devices; but I realized that any attempts to move pivoted magnets by the magnetic force of the hull, could hardly hope for success, because of the small forces brought into play.

So, I devised the scheme shown in the cut, whereby the puny force of a magnetic needle would be replaced by a force which could be made quite large; a force created by the rapid revolution of an armature made of many turns of wire.

In the diagram, a brass casing, 3, is shown secured to a warhead, 1. This casing carries a rotator, 5, which is continuously turned as the torpedo goes through the water, and therefore turns the shaft, 4, and an armature shown as an ellipse in the diagram, besides the armature of the little dynamo, 15. The current generated in the first armature by its revolution in the earth's magnetic field is too small to actuate the relay, 10; but if the torpedo reaches the strong magnetic field that exists under an iron ship, the current will so increase as to close the relay, 10, and send the current of the dynamo, 15, through the fuse, 2.

To take care of cases that might possibly arise, in which the field under the ship were of such a sign as to decrease the field, the relay, 9, is provided. It is so adjusted that if the current through it weakens, it will release its armature, and thus send the current of 15 through 2.



IGNITION SYSTEM FOR TORPEDOES

About three years ago I suggested this scheme to a number of torpedo officers and ordnance officers; but as nothing came of it, I finally patented it and put it on the same "waiting shelf" with a number of other schemes. I cannot see why any competent electrical engineer could not make this work in a month, at the most; and neither can I see why it is not the best scheme yet proposed for getting the most out of torpedoes. Certainly, it seems too important to be neglected. The patent was finally issued on May 31, 1921.

3. Coming now to the relative degrees of ease of hitting bombers and torpedo planes, let us realize that the defending ship knows the exact line (almost directly above it) to which the bomber must come, and can keep its anti-aircraft guns trained on that line and wait. And let us also realize that no one can tell even approximately the point at which a torpedo plane is going to launch its torpedo.

I find in talking with officers, that some of them picture a torpedo plane as coming from directly abeam, and the ship raising

a barrage of splashes ahead of her. But suppose the torpedo plane comes from ahead, swoops down and fires from directly ahead at a range of two or three hundred yards. Or suppose she comes from ahead, makes a feint to the port side and then suddenly shifts to the starboard side, and fires from about four points on the starboard bow. An airplane is so exceedingly mobile that a practiced aviator can perform such feats with ease.

We have thus far considered the individual ship as a target. Let us consider now the case of a fleet in formation, and suppose that a hundred torpedo planes fire their torpedoes (say at daylight) from positions on both bows, and five miles distant.

Problem: You are C. in C. of a fleet, about 200 miles from the enemy's coast. Contact with the enemy fleet seems probable, and you have your fleet in formation. Shortly after daylight, great numbers of airplanes are seen on both bows, about five miles distant. Soon, they seem to be flying away, toward the enemy coast. Ten minutes afterwards, great numbers of torpedoes pass through the formation, and five of your ships report that they have been torpedoed. *What do you do?*

"I would signal ships right (or left) as soon as the airplanes were sighted; and besides the fleet would be zig-zagging"—would be a ready answer.

But such maneuvers, while highly effective against submarines, because of their short range of vision and slow speed, could not long be effective against torpedo planes; because of their long range of vision, greatly superior speed, and consequent ability to divide into groups, and discharge torpedoes from several directions at the same instant.

It is difficult to imagine what effective measures a C. in C. could take or how he could refrain from adopting the purely defensive policy of continual dodging. Unless the lessons of history are misinterpreted by strategists, such a policy could not possibly lead to anything but ultimate disaster.

Clearly, a C. in C. of a fleet, attacked by torpedo planes near their own coast, could hardly expect to drive them away with pursuit planes, for the reason that the enemy would probably have more pursuit planes than he had.

4. Let us briefly consider now the problems of preventing accurate aim by torpedo planes and by bombers.

We realize at the start, of course, that if a bomber be prevented from dropping at the critical instant, he loses his chance altogether on that run, and must fly off and try again. Remember, the critical instant is really an instant; certainly it does not last more than a second. A torpedo plane, on the other hand, can fire at any time when the range is not too great.

Furthermore, during the critical period, the speed of a bomber must be absolutely uniform and the direction straight; for otherwise no spirit level or pendulum *or even gyroscope* can indicate the vertical correctly. The whole sighting apparatus of a bomber is based fundamentally on a correct knowledge of the vertical; so that even the slightest interference, by causing a change of course or speed, will prevent an accurate shot. The torpedo plane is subject to no such limitations. Provided that the range is not too great, it is merely necessary to point the torpedo at the target with the correct allowance for speed of plane and target, and the torpedo will do the rest. It is not necessary to fire at an exact instant. And the torpedo can make only one of two mistakes; it can go to the right or to the left. But a bomb may make a mistake to the right or the left, and at the same time over or short.

It is interesting to imagine also what would happen if anything were done on board the target ship, just before the bomber reached it, that would prevent a clear view of the deck. In such a case, the bomber's aim would probably be quite inexact. For instance, suppose that every time a bomber approached too near, twenty diminutive mortars threw a few rounds of smoke bombs directly up, so that they would explode about 500 feet above the deck, and make a horizontal smoke screen.

I trust that no one will construe what I have written as indicating a non-belief on my part in the efficacy of the bomber. I think that both are necessary in their respective spheres. "I like both ze white wine and ze red." I am merely trying to call attention to a weapon the importance of which, I think, has been underestimated.

I trust that the fact that I am the inventor will not unduly prejudice my case, in the mind of the reader.

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THE NEW FAR EAST DOCTRINE

By Commander C. C. Gill, U. S. Navy

The Washington Conference, 1921-22, met to stop the race in naval armaments and to compose difficulties in the Far East. Few people will deny the history-making significance of the treaties which were evolved. A common understanding has been arrived at as to general procedure in the development of Eastern Asia; dangerous competition has been curbed; the menace of unfriendly rivalry has, for the time being at least, subsided; and the naval race in building costly capital ships has been temporarily and perhaps definitely stopped. These are indeed great achievements. Similar conferences for similar purposes have been held at various times in the past, but never before has one been crowned with such spectacular results. This fact in itself is food for thought.

In order to understand the treaties and the new Far East Doctrine enunciated, it is necessary to comprehend the naval strategy of the Far East. The aim of strategy is control of the sea, and the influence of this principle of sea power in national growth and prosperity is now universally recognized. It operates, both in time of peace and in time of war. The pages of past history testify the influence of sea power; and events of more recent years add striking illustration. In the World War it was control of the sea that made possible America's decisive blow, launched 3,000 miles across the Atlantic at the critical time, at the critical point; and again, both at the Peace Table and at subsequent international conferences, witness the power of arguments backed by potential naval strength.

This was particularly true of the Washington Conference. The undeveloped treasure-house of Asia bids fair to make the Far East a future center of great commercial activity. Con-

trol of the ocean routes leading to the Orient has become a vital question. The strategy involved has received close attention and here we find the cause of the race in naval armaments. Sea power, therefore, was the main theme of the Washington treaties and considerations of strategy were in high control.

When the United States assumed a moral leadership and called this conference, the most dangerous menace to peace in the Far East was the prospective clash of policy between America and Japan. The latter country had taken advantage of conditions created by the World War to push forward a plan of aggrandizement in continental Asia. During the last twenty years Japan has brought under more or less effective control about 1,500,000 square miles of Eastern Continental Asia, peopled by about 50,000,000 non-Japanese—exclusive of Shantung. This Japanese program has conflicted with the open-door policy of the United States. Great Britain and France are also interested parties in the Far East, but their hands have been, and still are, full of more pressing business in other quarters. Russia, for the time being, is only a passive factor. This leaves the United States and Japan the chief actors in the Far East.

To assist the comprehension of Far East strategy, the case of the United States and Japan may be taken as an example. For the purpose of discussion, we might assume that the Washington Conference had not taken place, and that rivalry between these two countries had been allowed to develop. Under such circumstances, the first step in strategy would be to determine the political objectives of the rival powers, and the kind of war likely to result, if resort should be made to armed force. It might be reasoned that the aim of Japan would be to gain a free hand in her scheme of aggrandizement in the Far East, and the aim of the United States would be to maintain the open-door policy and thwart unlawful aggression, inimical to American interests. A war arising over these objectives would not be *unlimited*, as was the 1914-18 struggle between France and Germany, but would be what is technically known as a *limited war* —more like the Russo-Japanese conflict fought in the early part of this century. It will be recalled that in that war there was very little fighting in either Russia proper or in Japan proper; activities were confined to the sea and to the disputed area in East

Asia. So in the war of our assumed case between the United States and Japan, the latter would have no idea of invading United States continental territory; such a step would involve a hazardous and expensive campaign unnecessary to the attainment of her purpose. On the other hand, the United States, to gain her war objective, would be compelled to go to the Far East and forcibly stop Japanese aggression. The objectives being entirely in the Far East, the issue would have to be decided there. Such minor questions as discrimination in California against Japanese would play a part in arousing sentiment for war, and might be the spark to set it going, but could hardly assume importance enough to comprise a political objective for which alone the two nations would engage in active hostilities.

Assuming now that active war has ensued, what would be the preliminary strategic moves respectively of Japan and the United States? In the principal theater of this limited Far East war, Japan would be at great advantage as to position. In her own country, both the army and the navy would be centrally placed; her main fleet could be conveniently based secure in the Inland Sea, and operating from there, could successfully control home waters and dispute control with any hostile fleet advancing within a radius of 1,500 miles or more. The most probable strategy of Japan against the superior naval strength of the United States would be an *offensive-defensive*, similar to that used by Germany in the recent war against Great Britain. Japan would not at once risk a capital ship encounter to a finish, but would harass the approaching enemy with torpedo, mine and bomb, would give battle only on terms of advantage, and would try to wear down the superiority of the United States Fleet, until a general engagement could be fought with a fair prospect of victory. In this strategy her chances of ultimate success would be more favorable than were those of Germany against Great Britain in the World War, because the United States would be at the disadvantage of operating in waters 6,000 miles from home bases.

Under the assumed conditions, with tension between the two countries increasing, it may reasonably be supposed that before the breaking point were reached, the United States would take steps to protect her Far East possessions. It is interesting to recall that last year the Senate passed a bill to fortify Guam,

but this measure was held up in the House because of public sentiment for a reduction of armaments. With Guam impregnable, it is doubtful whether Japan would try to occupy the Philippines, and if she did, she could later be made to relinquish them by means of combined land and sea operations launched from Guam. On the other hand, with these islands in their present vulnerable status, Japan could and undoubtedly would, capture them before our fleet could arrive to protect them. This would give the United States a much more difficult nut to crack.

In any event, a *sine qua non* for the United States to bring naval pressure against Japan would be an adequate base within striking distance of the main theater of the war. With our fleet based no farther west than Hawaii, Japan could seize the Philippines and Guam, and generally speaking, work her will in the Far East. To win our war objective, we would have to advance to the Far East and establish there an adequate base from which to carry on offensive operations against the enemy. Japan in her home bases would be as secure as Germany was behind Heligoland; and, in order to conduct a successful campaign against Japan, the United States would have to establish a Far East base like "Scappa Flow," with protected communications, adequate docks, arsenals, repair facilities, fuel supplies and other resources. With the navy securely based there, we would then be in position to get ready expeditionary forces and consolidate our strength preparatory to the next offensive steps.

It is not wise to project strategy too far into the future. Successive moves depend largely upon contingent developments. The aim of the United States would be to draw closer the cordon around Japan. As soon as Japan's communications could be effectively interrupted, the pressure of the blockade would begin to be felt. A stage would eventually be reached when the Japanese fleet would be forced to come out and fight our main fleet, and the issue of the war would hang on the result of the battle. It should be added that Japanese strategy would hope by attrition to overcome American superiority before this battle.

But it is not necessary to go into details of strategy to understand its relation to the peace treaties. It is enough to note that the exercise of naval power depends upon position; that the needs of a modern fleet tie it to naval bases; that to control

SOLID CURVES INDICATE APPROXIMATE DIVISION OF POTENTIAL SEA CONTROL IN FAR EAST AS DETERMINED BY WASHINGTON TREATIES

any given sea area a navy must have an adequate naval base within striking distance of that area. For our present purpose it suffices to grasp this fundamental principle in its application to the strategy of the Far East.

Draw a circle with Manila Bay as center, with an assumed radius of 1,500 miles. This gives a fair approximation of the area which would be influenced by a superior fleet based in the Philippines. In case of a Far East war, it is obvious that Manila Bay would prove an admirable location for a main naval base from which to radiate subsidiary advance bases and exert control over the principal trade routes to China and Japan. It is at once seen that with a superior fleet and an impregnable Guam–Philippine base, the United States would control, potentially in peace and actively in war, the door to the treasure-house of Asia. But, by the agreements of the Washington treaties, the United States has given up her right to take advantage of this strategic position. (See chart p. 1483.)

From a strategic point of view, the most noteworthy provision in the Washington treaties is the agreement by which the *status quo* as regards fortifications and naval bases in the Pacific is to be preserved. Japan has agreed not to strengthen her outlying possessions; of these the most important islands, Formosa, the Loo Choos, the Bonins, and the Kuriles, are all within the radius of protection of her battle fleet based in home waters; the mandatory small islands north of the equator, acquired by the Versailles Treaty, fall outside this radius, but they have little economic value: Japan does not give up control of important possessions or of important interests. Great Britain has agreed not to strengthen Hong Kong, but has retained the right to establish fortified naval bases at Singapore and in home waters of Australia and New Zealand; Hong Kong is within the protecting radius of the fleet operating from Singapore (by another agreement Wei-Hei-Wei on the Yellow Sea is returned to China); Great Britain's interests and Great Britain's possessions are safeguarded in accordance with the principle of sea power. The United States has agreed not to strengthen her Island Possessions west of Hawaii; these include the Aleutian Islands, Guam, and the Philippines; the Aleutians are within the protecting radius of a fleet operating from United States continental ports, but

the valuable Philippine Archipelago and the strategically important island of Guam, both of which are at present inadequately fortified, fall far outside the protecting radius of a fleet operating from Hawaii: unlike Great Britain and Japan, the United States has abdicated the right to exercise potential control over important possessions and important interests.

The most far-reaching result of the Washington Conference seems to be that taking the naval treaties in conjunction with the Four-Power Treaty and the Nine-Power Treaty they enunciate a new Far East Doctrine. This doctrine is one of non-interference, which leaves Japan in potential control of the North West Pacific and Great Britain in potential control of the South West Pacific, while the potential control of the United States extends only about 1,500 miles west of the Hawaiian Islands. (See chart p. 1483.) To be sure, the agreement is only for ten years, but a doctrine that stands for ten years is very likely to become permanent. This new Far East Doctrine, as it bears upon Japan and the provinces of East Asia in their relation to other powers, has points of resemblance to the Monroe Doctrine in its bearing upon the United States and other American republics in their relationship to trans-oceanic countries. There is, however, one important difference—the Monroe Doctrine although tacitly recognized, is not formally conceded, and we must stand ready to fight for it, whereas the new Far East Doctrine is guaranteed by formal international agreement. Japan has struggled long for domination in the Far East and now, through diplomacy backed by her powerful navy, she has achieved her ambition.[1]

It is thus seen that our statesmen at Washington did not achieve great ends without making concessions. The United States has set an example. The question is, will other nations follow it? There is a danger that we may be misunderstood. Our hand is weakened in the Far East by this abdication of potential strategic position. With the right to exert the pressure of armed force thus lessened, we must watch closely to note the efficacy of arbitration and conference to safeguard our Philippine possessions, to protect our commerce, and to insure right dealing in China

[1] It is significant that Admiral Kato, Chief of Staff to Admiral Togo in the Russo-Japanese War, Minister of Marine 1916-22, and astute negotiator at the Washington Conference 1921-22, has now been promoted to the post of Prime Minister for Japan.

and Siberia. If there are nations still inclined to unscrupulous aggression, it would be harmful, not helpful, to the cause of peace to lead them to believe that to avoid war the United States is ready to take successive steps of withdrawal in the Pacific. Such a course would only serve to pile up trouble for future generations. Hence, forward-seeing statesmen vigorously oppose drastic slashing of our army and navy. The United States has given substantial evidence of good-will in settling international differences. Common prudence demands that we halt here and observe results before initiating a second step in disarmament by example.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

PROMOTION BY SELECTION

By Lieutenant Commander W. C. Barnes, U. S. Navy

The system of promotion by selecting up will in time tend to:

1. Create a system of bureaucracy thoroughly un-American in principle.
2. Destroy the independence of thought and action in our high ranking officers.
3. Break down the *esprit de corps* of our officer personnel.

I

The placing in the hands of a small group the power to perpetuate themselves and their ideals is bureaucracy. Selection up enables a group of leaders in Washington to select those who would fill their places and eliminates any element among the high ranking officers who think differently upon any important subject. To perpetuate their policies this group can build up around themselves a coterie of followers whose service would become personal service rather than independent service to country and lofty ideals. The reward for servility would be promotion, the penalty of independence, oblivion.

Selection up is sure to lead to self-sufficiency, complacency, self-satisfaction, and arrogance on the part of the bureaucracy, and indifference on the part of the rank and file. It will produce a group of pleasing, tactful, safe men; in some cases, able administrators, but it will not develop the fighting, restless Nelson or Farragut.

Such a system is un-American and a menace to national safety. It takes no wild flight of fancy to imagine the control of the navy in the hands of a group of officers whose policies are born of national or racial prejudices, and whose actions, protected from just criticism, would plunge the nation into a disastrous war.

II

In the words of a noted member of the American bar, "The friction of two minds causes the truth to scintillate."

Any system of promotion that stifles the independence of thought and action of an officer when he has reached the age of mature judgment is harmful to the progress of the navy, and will not develop the vigorous combative natures essential to success in naval warfare.

The self-perpetuation of a group of leaders, and the lowering of the independence of thought and action is the danger that must be faced, and is so great that it destroys the value of the system of selection up. It stifles the very characteristics that have given great naval leaders to the world. Such men are not desk officers, they are not men to bow the knee to any man and declare him always right. It is well known that the greatest advancements have been brought about by strong criticism by independent self-reliant men.

Promotion by selection takes away the independence of an officer at the time in his career when his judgment is mature and he is best suited to express his opinions in the nation's council.

To be a protagonist of a certain viewpoint naturally makes you an antagonist of the contrary position. Where the promotion of an officer lies in the hands of the opposite party, then that power does kill the independence of thought and action.

Any system of promotion must tend to develop the higher qualities in the men who will conduct the navy in battle. The characteristics of such men can only be arrived at by studying the great leaders of the past wars. It is notorious that men have made great mistakes in selecting men for such positions. The great leaders have been practically unknown until brought forward by adversity. They have not been the men popular with the bureaucracy nor men whose characteristics were pleasing to those who were higher up. In the Mexican War, Farragut applied for duty and set forth a plan of attack—his letter was never even acknowledged by the Department. Such a type of man does not seek to curry favor nor bow down to temporary authority. He respects authority, but does not see anything infallible in any man. The system of selection up is a system that is bound to be antagonistic to the fighting qualities.

III

The *esprit de corps* of the officer personnel depends upon co-operation and respect for proven abilities.

It has been stated that the men in power will surround themselves with sycophants whose ideals are inspired by selfish motives rather than devotion to the service and the nation.

The subordinates know that their advancement can only come through the good will of a certain number of the members of the inner shrine. They attach themselves to the following of one of this group, and use all their influence and power to support these individuals. The more influential friends, the more private means, the more skill in propaganda, the greater will be their success in being selected up to perpetuate themselves and their inherited policies.

With such a system, suspicion and jealousy of the earned recognition of a brother officer is bound to creep in. Even now we have the subtle propaganda, the rumor, and the whispered word in the ear.

It is well known that a capable officer of high rank was delayed in promotion several years through a rumor that was proven false, and he has not yet been restored to his place. Injustice once done can not be remedied and this though there was nothing on that officer's record to substantiate the charge.

Selection up is a system that cultivates servility instead of subordination. The attitude of the service toward it is shown by the action of an officer ordered to duty under a higher officer. His first action on learning of the orders is to make inquiry as to this officer's personal hobbies and prejudices. How trifling all this is! What difference should it make whether a higher officer has any personal hobbies or prejudices? Personal service lowers the ideals of our profession and our self-respect.

When an officer stoops to gain the good graces of his superiors to gain promotion, he loses the respect of his subordinates. When promotion is influenced by personal favors, simple acts of courtesy cast a suspicion in the minds of brother officers, that those acts are performed for personal gain.

When rumor and suspicion enter into the lives of naval men, the *esprit de corps* is shattered.

SELECTION

There is always a natural selection going on in the lives of naval officers as well as other men. Death and illness create a certain flow of promotion.

Many men from lack of interest in their profession or intemperance eliminate themselves. They could be selected out if the reporting seniors could express their honest opinions without fear of jeopardizing their promotion by antagonizing political powers.

The selection should take place in the lower grades, transferring the officers into the reserve with equitable compensation as now is the case with the enlisted personnel. The selection out in early life would give a man a chance to take up a new line of work.

Selection out saves a spirited man the humiliation of being passed by his juniors. A discredited officer cannot command respect, nor inspire the confidence of his command.

After reaching command rank, promotion should be by seniority. The feelings and spirit of an officer should not be hurt by being passed over after they reach the position where they stand out as individuals. It should be a cardinal principle that an officer's seniority should not be changed after he reaches mature years.

At that time in his life he should have the greatest possible independence of thought and action without fear of punishment outside those prescribed by the Articles for the Government of the Navy.

When a man's character and principles stand out, it enables those entrusted by the people to govern the nation to pick the men best suited to carry out national policies.

Selection for duty rather than selection for promotion is the true selection that carries with it no jealousy, injustice, or hatred, and will build up the character of the men who must preserve the nation in future conflicts.

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NAVAL CORPS, SPECIALIZATION AND EFFICIENCY

By Lieutenant Commander T. C. Kincaid, U. S. Navy

Much has been written in the past few months in connection with the special functions of the various naval corps, shore duty only, amalgamation and other kindred subjects having to do with the organization, duties and education of the officer personnel of the navy.

Promotion by selection and other methods of promotion have been analyzed and discussed and a board of officers of high rank has been appointed to consider recommendations on this subject. The method of promotion has, and always will have, a direct bearing on the duties, training and education of officers. Under one system specialists may thrive, while under another the jack-of-all-trades-master-of-none may have an advantage; and still another system may develop a good all-around naval officer who is particularly well informed in one line of endeavor.

Many of the articles written on these subjects have been inspired by arguments in which glittering generalities formed the basis of the discussion, bringing forth false conclusions, which are not borne out by careful analysis. The old corps jealousies and after-war hysteria are not entirely lacking in what we read.

That specialization of some sort is necessary can not be doubted and the number of pro-specialists in the service has noticeably increased in the past few years, as a result of observations afloat as well as ashore. This faction should not be entirely discouraged for their ideas are based upon fundamentally sound arguments, but their ideas should be carefully sifted and weighed against each other in order that the kind of specialization that will do most good, and least harm, will be obtained.

Corps specialization is decidedly unpopular, the feeling being general that special corps are both unnecessary and undesirable. The service would be far better served by specialists within the line who go to sea and operate the material of which they supervise the construction when ashore. The naval constructor and the permanent engineer are not the actual designers of material. They are supervising designers and the run-of-the-line naval officer can be trained to do just the work that these specialists do. In fact, the line officer has the advantage of practical experience afloat and is able to consider recommendations and criticisms from a broader point of view than the corps specialist who has remained on shore duty for several years.

The fact that line officers, after a special course of instruction, can successfully supervise the design of complicated mechanism has been demonstrated by the Bureau of Ordnance. There is no more complicated design work than that of a gun and its appliances. During the past few years enormous strides have been made in the development of ordnance material and all of the design work has been supervised by seagoing line officers. The development in fire control mechanism could not have taken place without the direct contact of seagoing officers who had a thorough, practical knowledge of the problems to be solved. The design of new material may be divided into two general functions; first, a clear-cut statement of what the mechanism is to accomplish, giving its general characteristics, followed by a critical inspection of the actual designs; and second, the actual calculation and arrangement of parts. The first of these functions can best be done by a line officer specialist who is familiar with practical considerations connected with operation and who knows what part this particular mechanism is to play in the operation of the ship as a whole. The second can be accomplished only by a designing engineer of whom there are plenty available in the drafting rooms of various naval establishments and outside contractors.

Specialists are required at sea as well as ashore. It is obviously impracticable and impossible for any individual to be expert in all the varied subjects of which an efficient naval officer is required to have a working knowledge. The officer who works up in the Gunnery Department through all the stages required to give

him a thorough knowledge of operation, procedure and doctrine, should be an expert gunnery officer, but the efficiency of the ship as a whole would suffer if he were detailed as navigator or chief engineer. In the same way, the trained engineer could not be expected to make an expert gunnery officer. The officer who flits from one department to another can not be an expert in any one line of endeavor, and certainly not in all lines. This does not mean that the average naval officer can not "get away" with a tour of duty in any department on board ship. The untrained gunnery officer or chief engineer may finish a cruise without court-martial and the ship may even stand fairly well in competition, but it is certain that maximum efficiency will not be attained and very little development can be hoped for if the heads of department on board ship are not specially trained men.

It is only natural that officers who specialize in the production of a certain type of material ashore should specialize in the operation of that material afloat. By such a system complete co-operation between the designers and operators of material should be obtained and maximum efficiency afloat should be the result. Continuous and progressive advancement of the multiplicity of arts, industries, and sciences connected with a naval officer's career can be obtained only in this way.

The establishment of seagoing corps would not accomplish our object. We would then have the old corps jealousies and narrow points of view. But that is not all. Teamwork would be extremely difficult, due to lack of understanding and sympathy between the officers in charge of the various stations in the ship. This was demonstrated years ago and was one of the causes of the abolition of the Engineer Corps. Each department on board ship, and each subdivision of each department, is merely a unit in an organization which must function as a whole. Each unit must not only perform its own function but must do so at the proper time and in such manner as will fit in with the other units for the efficiency of the whole organization. It is necessary that the commander of a unit have a working knowledge of the functions of other units and of the general scheme of operations of the whole ship's organization.

One line of endeavor in which specialization is greatly needed is that of administration. A flag officer generally selects his staff

from among the younger officers of his acquaintance in whom he has confidence, but these officers, until they have served on a staff, are entirely untrained for the special type of duty they are called upon to perform. There is no school of instruction for prospective members of a flag officer's staff and the officers selected are, in many cases, too young to have had the experience necessary to perform their duties efficiently. The details of administration can not be followed personally by the flag officer and important work, of a widely varied nature, is delegated to officers who have had neither the experience nor the training to properly perform such work. The result can only be inefficiency in administration.

For a number of years there has been a demand in the service for a greater number of school days for officers. The advance in technical subjects has been so rapid in the immediate past that the Naval Academy is no longer able to complete the education required for an officer.

The course at the Naval Academy lays a foundation upon which to build. It is excellent preparation for inferior subordinate duties. After about five years at sea, all officers should return to the Naval Academy for a period of one year for a postgraduate course in general line duties. At this period in his career, the officer has had an opportunity to test the theories learned at the Naval Academy; has had the responsibility of a watch, either on deck or in the engine room, or both; has occupied a position of more or less importance in the battle organization of a man-of-war; has profited by contact with older and more experienced officers; has developed a sense of responsibility and pride in the service; and usually has a definite preference for one line of work. His age and experience make his powers of learning vastly greater than during the initial instruction period at the Naval Academy.

The function of the general line course is the confirmation of initial instruction and the progressive and advanced instruction in preparation for duties of a higher order, laying emphasis on the subjects in which all line officers must be expert. Every line officer in the service should be an expert navigator and an expert seaman; should have a thorough knowledge of the laws governing the navy and the U. S. Navy Regulations; should have a thorough understanding of the organization and relative func-

tions of ships, shore stations and the Navy Department. A detailed outline of a proposed general line course was submitted to the Bureau of Navigation by a board appointed to consider the instruction and training of line officers and the report of this board was published in the PROCEEDINGS, U. S. Naval Institute, for August, 1920.

Immediately following the general line course, specialization should begin. If practicable every line officer should specialize and become highly expert in one branch of work. The specialist's course should correspond to the present postgraduate courses for line officers in ordnance and engineering and there should be added courses in naval construction, aviation, and administration. The length and nature of these courses would be determined in accordance with the requirements in each case.

After completion of this course, the line-officer-specialist would go to sea and be assigned to duty in connection with his specialty, and subsequent shore duty should follow the same line of work. This should not be an ironclad rule, as all line officers should be available for assignment to any line duty, but it should be the general rule followed in ordinary practice. When an officer had attained the proper rank for superior subordinate duties, he would become head of a department in which he had been brought up and his previous training and experience would insure not only proper performance of duty in a routine way, but aggressive performance of duty tending toward advance and development.

The next step in the education of the line officer is the Junior War College course which should be taken by all line officers after about twenty years' service. All specialists are again placed on a common footing, studying the principles of command and many important phases of tactics and strategy in preparation for duty as second in command of capital ships and commanding officer of smaller fleet units. All line officers would then have a common conception of war and would be uniformly indoctrinated. The senior members of a flag officer's staff would be competent to do strategic planning and to formulate doctrines.

Graduates of this course should be assigned to duty in accordance with their relative rank. Graduates who have not rank enough to be second in command of capital ships or to command cruisers or gunboats, should be assigned to command destroyers

or to superior subordinate duties in connection with their specialties on capital ships until such time as the necessary rank has been attained. Shore duty at this period should be of an administrative nature and may or may not be in connection with a specialty.

After completion of a tour of duty in command of a capital ship or group of smaller ships, officers who will attain flag rank should be detailed to take the Senior War College course. All captains should, if practicable, take this course, but, if the number is limited, only those officers who it is expected will be selected for promotion should be allowed to take the course. If promotion by selection remains in effect, the Selection Board should designate the officers to be detailed for this course if there is to be a limited number.

The Senior War College course should teach the higher elements of the profession which concern chiefly those principles that govern in the administration, operation and functions of forces and fleets. Without such a course, a flag officer can not hope to function at maximum efficiency. If a flag officer is promoted without having taken the senior War College course his first assignment to duty in his new rank should be at the War College. With the above system of instruction in effect flag officers would not be properly trained themselves but would be able to surround themselves by specially trained, competent staff officers to whom important duties could safely be entrusted. The president of the Naval War College should be required to furnish all graduates of the Senior War College course with a semi-annual letter, or pamphlet, setting forth all developments in the preceding six months in order to insure flag officers of several years' standing keeping up to date.

Many of the after-war difficulties which the service has experienced during the past three years are of a temporary nature, and will cease to give trouble as time goes on and the service settles down to a routine scheme of training a definite organization of men and ships. These difficulties, however, have served to strengthen the arguments of the pro-specialists and have convinced many officers, who did not believe it before, that specialists are essential to efficiency in the operation of our ships.

Within a few months after this country entered the war practically every gunnery officer in the fleet had been detached and

their places were filled by much younger officers. These officers, however, were essentially gunnery specialists having been thoroughly indoctrinated in the gunnery departments of the various ships in the fleet. This made possible the era of advance and development in gunnery which took place in our fleet during the war period. Within a few months after the signing of the armistice, practically all of these officers had been detached and, in order to have commanders as heads of department, older officers were ordered in their places. Many of these officers had been out of touch with gunnery for years and had great difficulty in catching up with the war developments. Expert submarine officers, destroyer commanders, and officers who had been serving on the staff of a flag officer found themselves woefully lacking in the knowledge and training necessary to drill and operate a ship's battery. Advance and development in gunnery were almost negligible and many of the lessons learned during the war have been lost.

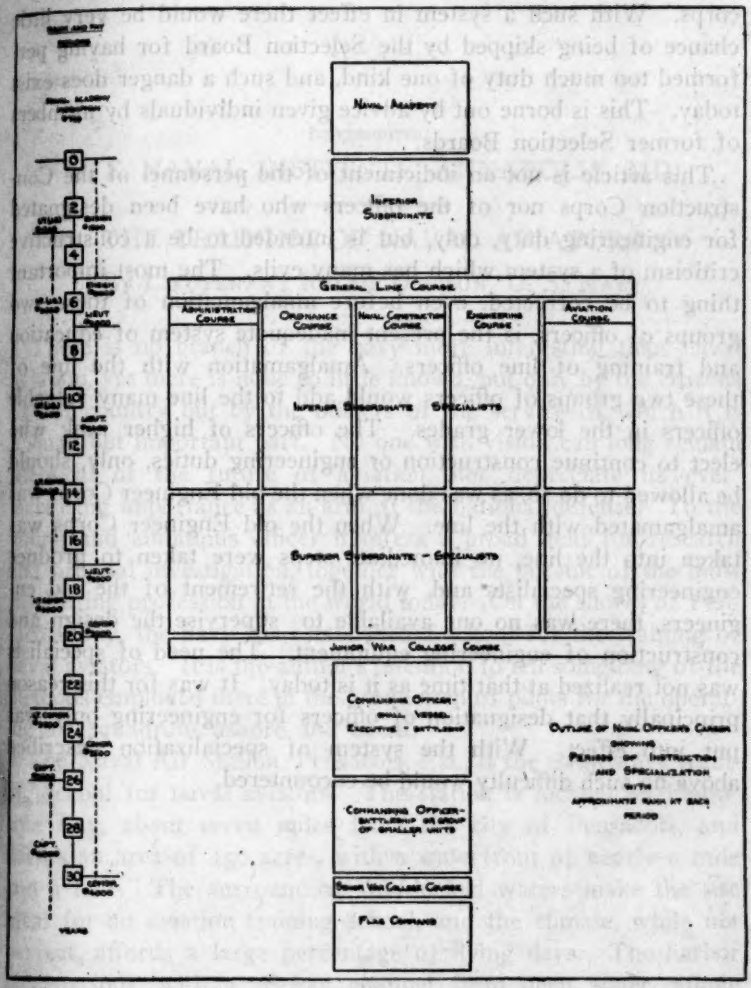
Much difficulty has been experienced in the operation and upkeep of the engineering departments on board ship during the past few years because of the lack of specially trained engineers. New destroyers, just built and commissioned, have been found after a few months to be in very poor condition due to inefficiency in operation and upkeep. Conditions afloat have been a matter of grave concern to the Bureau of Engineering, so much so, that compulsory instruction in engineering for a certain number of hours a week for all officers on board ship below the grade of lieutenant commander was recently considered. This condition will correct itself in time but it indicates clearly the need of specially trained officers—specialists. The immediate remedy for such a situation lies within the fleet itself. Within a few months vast improvement can be made by systematic instruction and indoctrination through the medium of fleet meetings and lectures, similar to the system employed in the Atlantic Fleet in connection with gunnery during the war.

Part of the difficulties in engineering are due to the permanent engineer. When the assignment of officers to duty in engineering, only, with perpetual shore duty after reaching the grade of commander, was being considered, there was doubt in the minds of many officers as to the advisability of applying for this assign-

ment. Those who did apply may be divided into two general classes: those whose interests are wholly in engineering and who are more or less averse to the duties of a line officer; and those who had performed so much engineering duty in the past that they felt that their chances for being selected for promotion would be jeopardized if they did not stick to engineering. A few may have applied because of the permanent shore duty feature.

One of the results of the assignment of officers to engineering duty, only, was the great difficulty in getting officers to apply for engineering duty. Young officers who would have been greatly benefited by a tour of duty in the engine room began to be shy of engineering. They did not want to be identified with a branch of work which led to permanent engineering and shore duty only. Engineering in their minds became a subject separate from the subjects connected with a line officer's duties. The law prevents officers of the grade of commander and above, who have been assigned to engineering duty only, from performing duty afloat, except in certain specified capacities, and the services of these officers are lost to the forces afloat just at the time when their special knowledge and experience would be most useful. The permanent engineer is unwelcome as chief engineer of a battleship because of the restrictions on the duty he may perform, and the fact that he can not succeed to command leads to embarrassing situations. Line officers who perform engineering duty afloat have a restricted choice of shore stations, as many of the desirable berths are occupied by permanent engineers.

The accompanying diagram shows the outline of the career proposed for line officers. After about five years' experience at sea the general line course is taken, followed immediately by a specialization course. Each individual then follows his own particular specialty until, at the end of about twenty years' service, all officers take the Junior War College course. The periods of command are followed by the Senior War College course before flag rank is reached. To the time scale at the left of the diagram have been added the rank and pay periods in the proposed pay bill to indicate the approximate rank at different periods in the career. Base pay allowed in the proposed bill has been shown merely as a matter of interest.


Naval Academy
Inferior Subordinate
General Line Course
Administration Course
Ordnance Course
Naval Construction Course
Engineering Course
Aviation Course
Inferior Subordinate Specialists
Superior Subordinate - Specialists
Junior War College Course
Commanding Officer-Small Vessel. Executive - Battleship
Commanding Officer-Battleship or Group of Smaller Units
Senior War College Course
Flag Command
Outline of Naval Officer's Career showing Periods of Instruction and Specialization with approximate rank at each period

The above scheme of education and training of line officers would give the service the specialists that are needed, doing away entirely with the old corps jealousies and lack of sympathy, and would correct many present evils. The officers of the Construction Corps and those designated for engineering, only, should be amalgamated with the line as was the old Engineer Corps. The same procedure could be made to apply to the Supply Corps and Civil Engineer Corps but it is not so important in these two

corps. With such a system in effect there would be very little chance of being skipped by the Selection Board for having performed too much duty of one kind, and such a danger does exist today. This is borne out by advice given individuals by members of former Selection Boards.

This article is not an indictment of the personnel of the Construction Corps nor of the officers who have been designated for engineering duty, only, but is intended to be a constructive criticism of a system which has many evils. The most important thing to be corrected, even before amalgamation of these two groups of officers, is the present inadequate system of education and training of line officers. Amalgamation with the line of these two groups of officers would add to the line many valuable officers in the lower grades. The officers of higher rank who elect to continue construction or engineering duties, only, should be allowed to do so, as was done when the old Engineer Corps was amalgamated with the line. When the old Engineer Corps was taken into the line, no immediate steps were taken to produce engineering specialists and, with the retirement of the old engineers, there was no one available to supervise the design and construction of engineering equipment. The need of specialists was not realized at that time as it is today. It was for this reason principally that designation of officers for engineering only was put into effect. With the system of specialization described above no such difficulty would be encountered.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE TRAINING OF NAVAL AVIATORS

By Lieutenant Ralph Davison, U. S. Navy

There is no branch of the navy more interesting than naval aviation, yet there is none so little known, not only by the citizens of our country but by the officers of the service of which it is a small but important part. No one with vision can long remain skeptical of the future of aviation, nor depreciate its ever-increasing importance as an arm of the national defense. To the young and ambitious officer it offers a broad field for research and original investigation, together with the pursuit of the most fascinating profession in the world today. On the shores of Pensacola Bay, the navy has established a school for the training of naval aviators. It is the author's intention to tell something of the methods employed there in the production of pilots for the operating air squadrons ashore and afloat.

The Naval Air Station, Pensacola, Fla., is the elementary training school for naval aviators. The station is located on Pensacola Bay, about seven miles from the city of Pensacola, and covers an area of 150 acres, with a waterfront of nearly a mile and a half. The surrounding land-locked waters make the site ideal for an aviation training school, and the climate, while not perfect, affords a large percentage of flying days. The harbor is capacious, with a 28-foot channel from deep water, ample dock and fuel facilities, and anchorage for any except the deepest draft vessels. The comparative isolation of the station and the absence of the distracting influences of a large city combine in producing an environment particularly adapted to training purposes.

The course is not designed to produce expert pilots, but upon its completion the student is well grounded in the principles and practice of flight and is prepared to assimilate the advanced train-

ing which is given in the service squadrons. The syllabus of training as prescribed by the Bureau of Aeronautics was planned by officers of wide and varied aviation experience. The methods employed are those whose soundness was demonstrated in our own and foreign schools during the late unpleasantness with the Central Powers, brought up to date, and extended to take into account the highly specialized functions of naval aviation.

The student body is drawn from the commissioned personnel of the navy. Three times each year the Bureau of Navigation calls for applicants for training; candidates are required to have completed three years' sea service, to be less than thirty-one years of age, and to pass a rigid physical examination, which stresses the vision, the reflexes, and the functioning of the semi-circular canals of the inner ear. Classes of approximately fifty are selected from among the applicants, and successful candidates are ordered to Pensacola to begin their training.

Upon entry, student officers are designated student naval aviators, the designation and the performance of duty involving actual flying carrying with them an increased compensation amounting to thirty-five per cent of the base pay of the officer concerned.

It is considered essential that every pilot should be thoroughly conversant with the details of the craft which he will be called upon to operate and to this end instruction in what is known as the Ground School is comprehensive and thorough. The subjects of aviation engines and the structure and rigging of aircraft are particularly exhaustive, and the student must master the practice, as well as the theory of both. He is required to disassemble, overhaul, assemble, and adjust every type of aviation engine used in the service, to assemble and align the training type airplane, and to study the details of construction of all types of aircraft now employed. The allied subject of aviation instruments is included in the instruction.

The theoretical aspects of aviation are next considered, and the student is instructed in aviation indoctrination, in aerodynamics and the theory of flight, in theoretical aerial navigation, and in aerology. With the exception of aerial navigation, the fundamentals alone of these subjects are taught, for the aim is to acquaint the student with the broad principles upon which

aeronautics is based, and not to go into the vast details of these particular branches.

The relation of aviation to the general mission of the fleet is covered in the special subjects of scouting, maneuvers, and communications. The texts employed are those in use at the Naval War College, with additional material dealing with the particular function of aircraft in the conduct of operations in the theatre of war.

Radio is given an important place in the curriculum, for the value of aviation as an adjunct of the fleet is dependent on rapid and accurate communication. Students are taught to operate, maintain, and repair the radio telegraph and telephone sets issued for aircraft use, and in addition are required to qualify as radio operators, capable of sending and receiving twenty words a minute. On practice flights, communication is established and maintained with the station, and a high degree of proficiency in operating the radio sets is attained.

Flight training begins with the second month, and progresses from then until the end of the course. The first instruction is given in the *N-9* type float seaplane, the present standard training plane. It is a two-place tractor biplane, with a Wright 150-horsepower motor, single pontoon and dual Deperdussin controls. The *N-9*, while not an ideal training machine, has at least the advantages of a large factor of safety, great inherent stability, and a remarkable freedom from mortality as a result of crashes. The student is given ten hours' dual instruction in this type, and at the end of that period is required to "solo" unless an extension of instruction is recommended by the Advisory Board, composed of the superintendent Aviation Training Schools, the senior squadron commander, the officer-in-charge Ground School, the officer-in-charge Gunnery School, and the chief flight instructor. It is during this period that flight inaptitude on the part of the student comes to light, for inability to solo in the prescribed time is an almost infallible indication of some constitutional or mental defect in the individual which renders him unsuitable aviation material. It is somewhat unfortunate that the preliminary physical examination does not always reveal this, for much time and expense would be saved, and the candidate spared the humiliation inevitably attendant upon failure to qualify. No stigma of

disgrace should attach itself to an inability of this nature, for it becomes more and more apparent that fliers, in a measure, are born and not made.

After qualification in *N-9's*, which requires a solo period of twenty-five hours, and the successful completion of a number of tests designed to demonstrate the student's ability, he passes through the intermediate *HS* flying boat type to training in *H-16's* and *F-5-L's*, large twin-motored planes with considerable power and cruising radius. Dual instruction amounting to five hours is given in each of these types and the student is then required to solo them for a period of ten hours.

Gunnery training begins in the third month of the course, progressing with the flight instruction, and for a month consists of ground and range instruction in the machine guns employed in aerial combat, and in the theory and practice of aerial gunnery and bombing. On the machine gun range the student learns the manipulation of his gun, the clearing of jams and stoppages, and the proper use of the sights employed. Upon completion of the ground instruction, the schedule calls for a series of practices in the air, to acquaint the student with the principles of aerial combat. Bombing practice follows, first with sub-calibre, and eventually with dummy bombs (the equivalent of sub-calibre and target shell in gunnery afloat) until the student is familiar with the offensive and defensive powers of the ordnance equipment of his plane. An elementary course in spotting from the air is the final subject in the Gunnery School.

Upon qualification in the *F-5-L* type, students are sent in teams of three on long-distance navigational flights over the Gulf of Mexico, performing in rotation the duties of pilot, navigator, and radio operator. Here they are required to put into practice the knowledge they have gained in the Ground and Flight Schools, and the completion of these problems represents the conclusion of the course. The student, well-grounded in the elements of aviation, is now ready for transfer to the service squadrons, where his advanced training in special branches awaits him.

(Recent extensions of the facilities at Pensacola will permit the training of students in land-type planes, a function hitherto devolving upon the Air Service Pilot Schools, U. S. Army, or

upon service squadrons. The field will be ready by 1 June, 1922, and with planes already arriving for assembly, a great increase in the aeronautical activity of the station is expected.

A torpedo-plane school is also in existence here, with rather limited equipment, it is true, but with officers of experience directing its training, and good prospects for additional planes and equipment.)

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

PERSONNEL

By Lieutenant E. R. Henning, U. S. Navy

The Disarmament Conference has halted competition between the naval powers for supremacy by number of ships. At the same time no nation can maintain a superiority on the sea by better quality of matériel or design. These things are virtually standardized.

What, then, remains to rank the first sea power? What but the men and officers who man the ships; personnel, the same old major factor, greatest always in winning battles, now by the stabilization of matériel, enhanced.

Hinted it has been that the other naval powers view with equanimity the holiday in building because they are confident the superior quality, organization, and longer training of their personnel outweigh any equality or excess of ships the American Navy may have. Is this national ego or are there grounds for this opinion?

However unfounded we may think this assumption, it should not prevent our turning a critical eye on the forces that man our ships. If there are faults, what are they? How may they be corrected?

Those whose interest in the personnel question is casual must have no appreciation of what confronts a fleet in a general action. It is a far cry from merchant ship guncrew duty or chasing submarines. Unlike land warfare in which now the whole manhood of nations comes to grips, a naval battle is a conflict of experts, a struggle between professionals. Land warfare is necessarily, on account of the huge numbers involved, fought by amateurs. The most militaristic of nations cannot make finished soldiers of all the masses war calls into action. The peace-time army is a nucleus.

How different the navy is. The combatant navy is a finished force whose training must be completed the day *before* the war. Woeful is the lot of the fleet which is under the compulsion of wide expansion and re-arrangement of personnel after the declaration of war.

The armed land forces may sustain one crushing defeat after another, but with a large spirited population to draw on, backed by tremendous resources and wealth, victory on land can still be wrung from the enemy. On the sea in a general engagement, the usual penalty of defeat is all major ships sunk or put out of action. A navy, beaten in a great battle which it may be forced to fight two weeks after the opening of hostilities, is finished. In a republic a philosopher expects the first two years of the war on land to be a series of reverses, with military efficiency a rising curve reaching a maximum hardly before the third year of the war. New armies may be made in eighteen months or two years, while a navy can't be built on the wreck of a defeated one in ten years. When rival fleets meet in decisive action, each has one great chance and only one. There are no great lines of entrenchments and fortifications prepared for the vanquished to take refuge behind for months, while girding up the loins for another try.

The greatest navy numbers comparatively only a few men in its fleet. It is possible to develop this small force to a high degree of skill, discipline, and spirit. When the enemy is a few thousand yards from the opening range, the men at the gun stations, in the fire and engine rooms, cannot be under training. They must be trained.

PERMANENCY OF PERSONNEL

Manifestly, the first requisite for efficiency is permanency of personnel. Sailors are not made by a brief sojourn at sea, nor are ships' companies co-ordinated into smooth running organizations by constant discharges and transfers. Personnel turnover and efficiency vary inversely. Ships of the first line must be in a state of constant readiness for war. Therefore they cannot permit but a minimum change of ship's company at one time. That is evident.

The statistics given in the following quotation from a recent issue of a service journal are highly significant:

Figures for officers of all corps and men of all classes and marines in the three navies are as follows: United States, 130,809; Great Britain, 142,088 (including colonial navy); Japan, 82,150.

Of perhaps greater importance in the comparisons than the table of figures is a study of the different conditions. For example, the British enlisted strength is composed of men serving in twelve-year enlistments, whereas our own enlistment periods are for two, three, and four years, resulting in a heavy turnover which amounted last year to 68 per cent. Of our force, 82,849 were youngsters in their first enlistment, and 16,552 more men had had less than four years' previous service. The British Navy last year included 68,361 men serving in the first period of continuous service, viz., for twelve years; 21,000 men were in their second period of continuous service (ten years to complete time for pension), and 8,501 were in four so-called "short service" (five years plus seven in the reserve). As for the Japanese Navy, it is known that the proportion of trained, efficient men is much greater because of the nature of her population. An American captain recently detached from a battleship stated that his former command averaged less than nineteen years of age and consisted in large part of men serving in their first enlistments. In the absence of any continuing policy with regard to either complements or periods of enlistments in this country, it is inevitable that a large percentage of the enlisted strength is composed of recruits at shore training stations or green men learning the rudiments of their work on board ship. The past two or three years have been a period of constant turnover of enlisted personnel, with a recruiting drive followed by a wholesale discharge of men, closely followed by another drive, only to result in a heavy reduction due to a diminished appropriation.

Can such a situation in the American Navy be long tolerated and a high standard of relative efficiency maintained? It is an acute situation and its remedy requires radical measures.

The first step is a radical one. *Make the first enlistment six years.* It is not necessary for me to hold forth the advantage of this. Every officer knows the adoption of the long enlistment period would result in the nation getting a return for the early years when the recruit is receiving and not giving. Other powers have six- and eight-year service periods. Isn't it somewhat fatuous to believe that we can do as much with our recruits in four years?

The great objection to the long enlistment period has been one of expediency; sufficient men could not be gotten for such long service. What better time is there to try it than now, when the navy is not pressed for men? A trial would demonstrate that the six-year enlistment plan could maintain, with ease, a navy

of 87,000 men. That would mean in round numbers replacements by enlistments and re-enlistments of 18,000 men a year. It is reasonable to believe that among men who had served six years a high re-enlistment rate could be maintained, probably as high as 8,000 a year. The recruiting agencies would have to enlist 10,000 men a year, not a difficult figure. Better men they would be too; not the kind who enter the navy for a convenience, but the sort to make the sea a life's work. I refrain from going into detail on the incalculable saving in money and matériel in the resultant great reduction of number of men necessarily under training, by the adoption of the six-year period of enlistment.

That, however, is not the only thing to stabilize personnel.

Too many men, yes, too many officers are birds of passage. An unvaried rule to make the length of service of men and officers on ships and stations a period of three years, and not to authorize transfers except for reasons of the gravest nature, would show some startling results in the efficiency of most ships. Matters of slight personal convenience should not be considered as warranting a transfer. In fact, with the rule rigidly enforced, it is highly probable that the desire for transfers would not develop as frequently. The enlisted man has almost gotten to the point where he considers it his prerogative to request transfer, following disciplinary action or firm language from one of the petty officers.

It would improve the mental attitude of all hands. The fact that a ship could not be dodged by a transfer, that it was a man's for several years, would be an inspiration for energy. Who has not more than once observed the chief petty officer who worked no harder on his station than inspection enforced, because, "I'm going to the West Coast soon." To take a specific case, has any one failed to observe what happens to a pair of submarine engines when there are three or four chief machinist's mates attached to the boat inside of a year? There is always the other fellow on whom to blame unspeakable valves, or pumps which won't work. The chief petty officer who has the same duty for two or three years can't attribute neglected engines to the man before him. He knows it too. It shows in his work. The engines are his.

Frequent transfers foster a restless spirit in the personnel. The Department has recently recognized this tendency of the

enlisted men to "float." Recent instructions direct that all stragglers are to be returned to their commands, recognizing the prevalence among men of the resort to report some place else after their ship has sailed to avoid disagreeable duty.

Of no small importance, the strict enforcement of the rule to prevent transfers, would check another growing evil. Time after time nearly every executive officer has the experience of receiving men whom a few days of observation show to be undesirables, usually petty officers rated during, or immediately after the war, by that fine frenzy that possessed some officers for rating every one without regard to his qualifications. These men come to ships with long record of ships served on, with transfers every two or three months. No one has the moral courage to break them. It is easier to pass them along to some one else. I need not enlarge on the unfortunate effects of this unfair practice.

To correct this situation the following measures are advocated:

(1) Allow no transfers *to* ships of the first line of men having less than three years to serve.

(2) Permit no transfers *from* ships of the first line until after three years' service on that vessel except under exceptional circumstances which must be referred to the Department.

(3) See that men unavoidably transferred from ships of the first line to hospitals, etc., are on return to duty ordered back to their command.

(4) Until the observance of the above rules thoroughly stabilizes the personnel, the men at receiving centers ready for transfers who have periods less than three years to serve, detail to auxiliary vessels and non-combatant craft on which the organization is not as complex and the duty does not require such co-ordinated training as in the fighting ships.

(5) The Bureau of Navigation can very readily institute the three-year rule for officers.

The personnel, kept in a state of flux, time in the navy which should be spent in advanced training and co-ordination, must be diverted to organization and elementary training of recruits.

TRAINING STATION EXPERIENCE

In any discussion of the improvement of the personnel of the navy, attention cannot be spared to the importance of every recruit, regardless of what branch of the service he is entering, completing the full term at the training station. Here the unfit may be weeded out, the deficiencies that got by the recruiting officer found out. The man who has gone through the training station has all the earmarks so apparent when he is compared with any of the unfortunately large number of men in the service who have had no training station experience.

The training station period for every man should be six months including a three months' training ship cruise. Incidentally, under the adoption of the six-year enlistment plan, the recruit could more readily be spared for a six months' training period.

In considering the training station, the importance cannot be too strongly urged of sending exemplary chief petty officers to this duty as instructors, men of outstanding character and personality, men who are experts in the specialty they teach. Nothing makes such a farce as a chief petty officer with a meager knowledge of the drill book attempting to drill a group of youngsters many of whom have had military experience.

Nor should the disciplinary officers at the training stations be men who have reached that stage of their careers where complacency is more evident than energy. The recruit is highly impressionable.

Start him off neat, orderly, smart in uniform, thorough and obedient, and ten chances to one he will remain so throughout his cruise. Let him find out that drill may be slovenly done, orders neglected, and a dirty appearance tolerated, and it will be unlikely that he will ever be broken of his habits aboard ship.

If a martinet has any justification anywhere it is at the training station. It is easier to slack down than tauten up.

MILITARY STANDARD

Military standard is the foundation of an armed force. It is the influence that co-ordinates, that binds the whole. High military standard fosters thoroughness and attention to detail, parents to efficiency. It opposes slovenliness, whether that slovenliness is in standing a quartermaster's watch or repairing a pump.

The military standard of the personnel of the American Navy has been lowering through a period of years, particularly those of the Great War. During the rapid expansion of the navy, thousands of men were inducted into the service and sent to sea without training station experience. Following the war, during the harrowing days of demobilization, the two-year recruits were enlisted directly aboard ship. Not only many of these men, but officers too, with little or no military training, still remain. Their lack of training, and often even sympathy or understanding for its need have lowered the general standard. Military standard like labor saving machinery is opposed by those who have no experience with it.

Not altogether to the latter may the fault be laid. For years previous to the war the officer was a type, who if not avowing open hostility to the maintenance of military standards, never showed the slightest energy in instilling it in his men. The type is still prevalent. "What, a blue jacket is not a marine, you can't make him military, it is not in him!" They say it as if the blue jacket was recruited from some different timber than the marine, as if he were of some different race. Listening to them, the uninitiated would gather that the smartness, the exactitude with which he obeys orders, the *esprit de corps* of the marine, if found in a blue jacket, was to be deplored.

Man has been fighting since he fared forth from the Garden of Eden, and if he has learned one thing surely, it is that masses of men numbering more than ten for the highest combat efficiency, can be controlled under no other than the military system. Even our friends the Bolsheviki have learned this lesson.

Then, if the military system is necessary, is there any excuse for observing its requirements in a lackadaisical or slovenly fashion? If there is, there are several pre-eminent naval powers who are expending energy in useless efforts.

Does it breed good habits for the division officer to call his division to attention and have half his men remain with their hands folded behind their backs, some talking, others with heads turned around looking at passing shipping? Yet this is the rule rather than the exceptions on many ships. Does the seaman who remains sitting on a ditty box as the first lieutenant speaks to him exemplify the proper respect for superiors and the re-

sultant respect for their orders? The same man would jump to attention if the chief petty officer of his company at the training station spoke to him. Why is it the fashion for him to forget these things in the fleet? Is the youngster who is permitted to argue an order with the boatswain's mate breeding good battle habits? Is the blue jacket sentry who remains sublimely indifferent in his seat, as an officer passes, something to boast of? The regulations are specific. Are they made to be ignored? Do such men promise to make good submarine lookouts? Slouchy sentries stand their gun station in war slouchily. They all are being indoctrinated with the habit of indifference toward orders.

To the superficial thinker these things are inconsequential details. He doesn't see that habits of mind are being inculcated which will bear fruit in graver moments.

How often is the plaint heard that the chief petty officer is less and less realizing the twofold nature of his duties, the military as well as the professional? Why the great difference between the first sergeant of marines and the average chief petty officer in the reliance that may be placed on them for the maintenance of discipline? Why is it true that so many chief petty officers regard themselves simply as mechanical experts in uniform, with responsibilities which end with the upkeep of machinery detailed to them? Not only the chief petty officers but the men, particularly in the artificers' branches, view with surprise the imposition of military responsibilities. Really isn't this to be expected when you take a boy from civilian life, give him little or no training station experience, and then put him in the fire room aboard ship, where he does nothing but stand his watch?

The remedy? Concretely, the same thing they do at the military schools, for the purpose, they say, of building character; they call it the disciplinary period at the Naval Academy—infantry drill. Not infantry drill for the deck force alone, but for all hands, engineers, electricians, yeomen, mess cooks, all; drill to inculcate proper battle habits. The yeoman in the plotting room, the ship's cook in the ammunition party are just as important cogs in the machine as the seaman in the gun crew.

I will refrain from dwelling on the advantage of having a capable landing party aboard each ship. Time and time again the

occasion arises when the blue jacket is compelled to play the soldier ashore, and lack of knowledge of infantry fundamentals is embarrassing if not tragic.

To inculcate the habit of instant obedience, alertness, and attention to orders, nothing can be substituted for infantry drill. To make the petty officer used to the sound of his own voice, to get him in the habit of expecting instant obedience, there is nothing like it. It is truly, discipline drill.

True it is that infantry drill is carried out by the deck force, aboard the battleships. Aboard the gunboats and cruisers landing parties are occasionally made. This personnel is still a minority of the total in the navy. What drill is observed aboard the great number of ships on detached duty, auxiliaries, shore bases?

When infantry drill is held, how perfunctorily it is carried out. Many of the petty officers know next to nothing about drill regulations. If the drill regulations are to be taken as a standard, many drills are nothing short of a comedy of errors. Instead of the drill effecting the end aimed at, smartness, alertness, thoroughness, promptness; the reverse results. Better no drill at all than a slovenly one.

Much depends on the officers. It does not take long for a crew to realize that reports are to be made in a military fashion, that neglect or indifferent obedience to orders will not be tolerated. It does not take a crew long to realize when the officers do not regard it their personal option whether or not to enforce regulations on salutes. Strictness has never made an unhappy ship's company. The men know where they stand. Respect demanded engenders respect.

The officer who nurses the covert ambition to be considered the "good fellow" is one of the fundamental causes of low standards. He fosters the slack ship. Though often he gains in the end his just deserts, contempt where he seeks esteem, he is one of the greatest agents of the lowered standard.

It will require plenty of backbone to bring the military standards in the seagoing navy back to a high level. Long tolerated abuses have become vested rights.

In fine, if the American Navy is a military organization, as the reading of the regulations, rules and instructions for its government indicate the intention is, then let us run it as such.

PHYSICAL TRAINING

Time was when the seafaring life developed the greatest physical hardihood. Laying aloft, furling and unfurling sail, small boat work, all bore a part in making the sailorman the sturdiest of men. After the passing of the sailing ship with its activities, frequent coaling ship helped to keep the blue jacket fit.

Change has come. The oil burning navy, with the electric motor everywhere doing the work that sinew and brawn used to do, has taken the place of the old navy with its muscle building work. The fireman in the oil burning fire room has a life of no more physical activity than the captain's yeoman.

What has been done to take the place of the active life of the old ship? What has been substituted to build up the physical fitness necessary for the stamina which battle requires?

The Swedish drill? Yes, on the battleships the Swedish drill exercise is routine for fifteen minutes or half hour a day. Some of the lesser ships, too, have physical drill. More have no drill at all. In the shore based navy, physical drill as well as every other kind of drill is noticeable by its absence.

It will be urged here that athletics, so widely engaged in throughout the navy, give the blue jacket plenty of physical exercise. That is one of the great illusions. There is of course a small minority of men in every command who are in for every sort of athletics. They keep themselves in excellent condition. The vast majority of the men in the navy are merely spectators, not participants in athletics. Then there is a considerable minority who, when work is knocked off for athletics, utilize the time for extra sleep. What about their physical development?

Organized physical training is the only way to maintain high physical development. Swedish movements are good, but they alone are not sufficient. They have as much calisthenics at most modern girls' schools. More exercise is needed to develop a navy of men, all of whom are fit.

I realize the value of athletics in the fleet. There are those who bitterly condemn athletics, who point out to you that frequently necessary drills and ship's work are passed up on account of ball games. This attitude is unreasonable, though an occasional commanding officer, suffering from the athletics "complex," can work incalculable harm. Transfers of men are

engineered solely for their athletic ability. Everything is subordinated to obtaining a champion team. Under such a régime the same condition is fostered as that which forced some of our leading colleges this year to institute vigorous reforms in their athletic standards.

A high average of physical fitness for the entire crew is more to be desired than a half dozen champion teams. Better than a champion cutter crew of the fleet, is a ship's company, each and every one of whom could stand a mile's hard row without collapsing. The ship boasts empty honors that has three boxing champions and the rest of the crew slack bellied. By no means discounting the glory of having the fleet champions in football, yet rather would I have a crew that could hike ten miles, and do the last mile on the double, all the crew sound physically, not an exalted tenth.

Athletics do have their functions. They serve as a stimulus to perseverance for physical fitness, they foster the ideal. But neither Swedish drill nor athletics suffice.

More time and interest should be given to the physical development of all hands. I have never yet seen a ship or station that could not afford a period of one hour a day for personnel development, a period for military discipline and physical drill for *all* hands, officers and men—infantry drill, exercise in small boats, boxing, wrestling and a weekly hike when in port for every officer and man in the complement. One hour a day, five periods a week, can't the navy spare that much for the development of its men?

Far be it from me to discount the opposition such schedule would encounter throughout the navy. On the first day of an infantry drill or boats under oars for the engineers, or boxing or wrestling for the electricians, the chief engineer would rush up to the executive officer with an appalling work list. The electrical officer would have half the armatures aboard ship to rewind. The first lieutenant would be under the compelling necessity of breaking out all the store rooms and the hold, and restowing them before four o'clock. The paymaster would be struck dumb if told that for the well-being of him and the yeomen of his force they would join the party going on an hour's hike. He would suddenly discover a legion of returns that had to be made instantly. Petty officers who might be found sitting on

the shady side of a turret engaged in a profound and placid contemplation of the universe would suddenly find a half dozen jobs on which the safety of the ship depended, when directed to get ready for infantry drill. From one and all as many unanswerable reasons would be given as those of a captain's yeoman why he should not be subject to the indignity of Swedish drill.

In most shore based establishments, there would be imminent danger of a head of a department bursting a blood vessel if told that from three to four that afternoon the enlisted personnel of his department would have to get out for drill. There, too, where the need is often the greatest. Drills and inspections at a minimum or none at all, the shore-going is often not even creditable in appearance. Neatness and smartness of uniform, is the exception and not the rule. Nor are the enlisted men alone, it is regrettable to say, in bearing out the above.

Nothing save an imperative order from the Department, so specifically worded that obedience is unavoidable will compel the universal devotion throughout the navy of one hour a day to personnel development. As its results are appreciated, obedience will be more willing.

MORALE

Morale development, to most naval officers, depends on moving pictures, smokers and athletics. They are partly right. Entertainment unquestionably is necessary for a happy frame of mind. Yet high morale is more than content. High morale in a military sense is that state of mind which wins battles. Work for the high morale means work to induce a spirit in the personnel for successful battle thinking.

What do we do in this regard? Our recruits are as a rule young men of considerable spirit, and aboard ship an excellent general spirit usually prevails. An honest and keen observer would say, however, if there is any fault to be found with the mental attitude of the American blue jacket, it is the lack of *esprit de corps*, the lack, at least on the surface, of pride in the service. Now pride, no matter what it may be considered elsewhere is not only desirable but necessary in a fighting man. Pride will keep a man facing a danger, on which with brute courage alone, he would turn his back. Pride forced a French marshal to gallantly charge the enemy on repeated occasions

when he admitted his quaking knees would have carried him to the rear.

Much of this pride in the fighting man is developed by example, what those before him have done. Drake's repeated victories over the vastly outnumbering Spanish forces laid the belief that one Englishman on the sea was worth five Spaniards. This belief helped to defeat the Spanish Armada. The Spaniards doubtful, the English superbly confident, settled the issue. Tradition is the invisible host that spurs the victor and weakens the vanquished.

Now, there is no navy with more splendid traditions than our own; defeat rare and never dishonorable, no task too hazardous to find ten times the men needed for its attempt. Yet of the splendid stories of the navy, is there one blue jacket in twenty who has the slightest knowledge of them? How many men know the history of the *Constitution,* or are familiar with the story of the cutting out of the *Philadelphia?* Many do not even know what the *Oregon* is celebrated for, or what Hobson's attempt was in the harbor of Santiago. Has any effort been made to familiarize the personnel with these tales, heritages of victory? With one exception, I have never seen any. Several years ago a circular letter was set forth suggesting that information on the history of the navy be published to the personnel. In most cases that letter went to the files or the waste basket, one of those trifles not worth bothering about.

Yet every student of psychology knows that habit, or custom, is one of the great controlling forces of human life. Those races to whom it has been customary to win battles or to fight to the death, never to recognize defeat, do so because it is their tradition to do so. Those whose history furnishes no tales of stirring victory, but frequent examples of flight from half fought fields, of pusillanimous surrender, will fight half-heartedly again. They have the precedent of it having been done before to justify them.

The American general in the recent war, receiving the order to give up his position, who protested to his French superior, "Americans do not retreat" was of the mind that wins battles.

Is it a trifle, then, that if the test of battle ever comes, in the tense moments as the great turrets swing slowly over the cleared decks toward the enemy line in the far horizon that the

men at the guns, that the men below decks know that Americans have never failed their country on the sea? Is it a small thing that their brains may conjure up pictures of Perry on the Great Lakes; or Farragut at Mobile? Will they not be strengthened by the knowledge that though the fleet actions of our navy have been few, in every case all ships of the enemy were sunk or captured? This is not sentiment; it is psychology. Lack of tradition was probably the final reason why a certain great navy ingloriously sailed forth to give themselves up to the enemy without firing a shot. We, with a wealth of glorious traditions, shall we neglect them?

How is it to be accomplished, this inculcation, indoctrination of the personnel with the ideal frame of mind, the victory frame of mind?

It can be readily done and with little effort by the propaganda method. In the living quarters of the men, on the bulkheads beside the broadside guns, post framed illustrations of the stirring stories of the navy with a history of the event in inspiring language. Once a week use a few minutes of film in the moving pictures for a story of the navy, with illustrations if possible. Interesting statistics showing the number of vessels sunk or captured by the *Constitution*, the successful sloop actions in the war of 1812, the fact that a vessel of the navy has never been in the hands of mutineers, these all, could be made a matter of knowledge throughout the navy by that tremendous medium, the moving pictures. If the navy could obtain or have produced a series of romances based on historical events on the sea and use them in the moving picture entertainments, knowledge of the naval traditions could be further spread through the service.

All this effort must be made to groom the navy to a standard to assure victory in battle. The personnel of the other great naval powers are drawn from a seafaring population; they are animated by a spirit and tradition of victory. From this splendid material, excellent seamen are made by long periods of service afloat.

We take the boy out of the New England factory or store, or off the middle western farm and put him in uniform. Can we afford to train him less thoroughly? In training it is the details that count.

THE RESERVE

No discussion of the personnel problem is complete without consideration of the reserve. It is telling no secret to declare that the reserve up to the present has not been in a satisfactory condition.

A reserve to be of any value must have two qualities—training and the ability to mobilize at short notice. The reserve, thanks to the past war, has the necessary seafaring experience. But can it be mobilized rapidly? Or does the actual detailing of the reserve commence after war has been declared? If so, the organization is dangerously defective.

Will the situation arise when the navy again faces war, that the reserve report in at certain large mobilization centers and there be hastily detailed by young reserve officers to the various ships which are madly calling for drafts of men. In the hurly-burly of confusion, the submarine trained men will go to the cargo boat, the water tender to the submarine, the chief torpedoman to a gunboat. That invariably happens when an organization is such that a tremendous amount of paper work must be done on the advent of an emergency; when a small organization must suddenly be greatly enlarged to handle large numbers of men, when untrained yeomen must be taken into service to do a large press of paper work.

I am reminded of a condition that existed at a certain large receiving center during the war. Thousands of men were gathered there without the facilities to handle them. Two old excursion boats were taken over to quarter the men. Drafts were coming in and going out. No regular officers were available for duty in charge.

What confusion existed cannot readily be imagined. A certain phase of it would be illuminating. A ship fitted out, ready for sea, would call for a hundred and fifty men immediately. A personnel yeoman would type out a list of 150 men attached to the station and send it over to the aforementioned excursion steamers. An officer on duty there would give the list to a petty officer who would go through the decks calling out the names of the draft. After the elapse of some time, possibly ninety men would be gotten together. Then word would be sent over to the receiving ship offices that sixty men could not be found.

Thereupon the personnel yeoman would make out a list of sixty new men. Possibly forty of these men would be found. Then a new list of twenty would be sent over. Finally the draft would be assembled.

During the next two or three days the absentees would be assembled at the mast. The uniform excuse would be that time-honored one, "I was in the head, sir," or that they were out with a working party. It was said that some individuals avoided going to sea for many months by the above method.

In time, after months elapsed this condition was remedied. Proper quarters were provided. A regular officer of organizing ability took command.

In the next emergency will time be vouchsafed to do our organizing after war is on us?

It is a temptation to include many other stories of the handling of personnel in the early stages of the war; of elegant young gentlemen whose fond parents for the consideration of a lieutenant's commission bought small yachts for them to engage in the hazardous pursuit of the enemy submarines on the Atlantic littoral; of the other gentlemen less elegant, whose enlistment while saving them from the possibility of the trenches was followed by duty strangely of such a character that they were able to carry on their New York businesses; of commissions and ratings gained in certain devious ways. These are war-time classics now, something to smile about over ward room tables, but would these stories have been so droll had the enemy been loose on the high seas?

After months and months the personnel situation was well in hand. Organization was effected. If the occasion again arises can we be sure equal time will be granted us to transpose an organization made for peace-time routine to one fit to cope with war emergencies?

The situation described is likely to happen when men have to be gotten together in a hurry. Why not avoid this if the time comes again? The war-time organization can be effected now. Contingencies can be prepared against. Von Moltke is still right.

The first consideration is where the reserve is to be used. It cannot be too strongly urged against filling up the complements of the battleships of the first line with reservists. Notwithstand-

ing what objection may be raised, the dreadnoughts of the fleet should be kept manned at the strength they would go into battle. Putting a large draft aboard a battleship tends to confusion, no matter how well trained the individuals of the draft are. Their absorption, assimilation in the organization of the ship, is the matter of weeks or months. They throw the whole "team" out of gear. The plan for the reserve should contemplate filling out the ships operating under reduced complement, auxiliaries and other vessels whose crews are not as highly organized as those of the battleships.

Most officers attached to the fleet will not forget our entry into the last war when many of the trained gun crews were transferred to armed guard work on the merchant ships and recruits in the hundreds were thrown aboard the ships of the fleet. Suppose the fleet two weeks after the declaration of war had had to steam forth to a major engagement?

Speed of mobilization, getting the reservist where he is needed immediately, is the paramount requisite of an effective reserve. To achieve this, some different system must be developed. How can it be done? In this wise.

Each ship will be accountable for its own reserve, the enrollment retainer pay, transfer, discharge and mobilization. The destroyer *Dent*, we will assume, based at Philadelphia with reduced complement, half or less what she will need in war-time. She will recruit her reserve among former navy men, preferably destroyer men, men that have been discharged. John Jones, quartermaster second class, is discharged. He does not intend to re-enlist. He is going to his home in Wilmington. Good. Will Jones enlist in the reserve on the *Dent?* Nine times out of ten he will. The yeoman gets all necessary information from Jones. Jones is instructed that on the outbreak of war, when mobilization is declared, he will immediately take train and report to the *Dent*. He is given an identification card, setting forth that he is a naval reservist and directing any railroad to honor that card for passage on the mobilization of the navy. Smith, water tender, who was discharged three months ago from the *Dent* is sent a letter asking him to join the naval reserve for service in time of war.

In this manner a reserve crew is built up for the *Dent*, carried on the rolls of the *Dent*. War declared, that destroyer has a

full crew in two days, a crew that has been trained on that vessel, a crew who know each other. No time wasted in training a draft most of whom would be without experience on a destroyer. After the declaration of war, the overcrowded receiving centers haven't time to pick the men properly qualified for the duty they are detailed to.

Two hours' work a day would be sufficient for one yeoman on each ship to keep up the paper work necessary for such an organization. One week a year service would be ample for the trained reservist. Active duty should be at the same time for all reserves, a check on the mobilization system as well as on the individuals. The pay for *the entire year* would be given the reservist on the expiration of the week's cruise. Absence would result in the forfeiture of pay.

The same system can be applied to cruisers, gunboats, submarines and auxiliaries.

With mobilization declared the newspapers throughout the country publish the points where reservists report to join their ships. This will give no information which the enemy will not know. Trust their intelligence service for that. It is a waste of effort to conceal something which is no secret.

Isn't the advantage of this apparent? *Mobilize navy* announce all newspapers. Immediately all reservists start for their ships. In three days every reserve ship has its full crew, full crew of men who have served on that particular ship in most cases.

Officers and men whom it is contemplated to use on shore stations can be detailed *now*. They too will immediately report on the mobilization of the navy.

In the merchant service there are certain vessels which the Department can decide now would be necessary to divert to the navy on the declaration of war. It would be entirely feasible to arrange with the private owners to man the ship with naval reserve officers and men so that on the opening of hostilities, the vessel could automatically shift to the navy. In fact the proposed ship subsidy can be made contingent on manning ships benefited, with reserve personnel.

Contrast the above method of handling the reserve with the complex organization heretofore attempted, the naval district idea. Thousands of reservists cannot be handled from office

buildings. In the first place it requires expenditure of much money for office work which just now Congress has not made available. In the second place it does not maintain personal contact between a ship and the reservist. Any system for the reserve which involves a tremendous amount of paper work to keep going, and more after the declaration of war is fundamentally defective.

The proposed system has the virtue of utmost simplicity. It removes the handling of the reserve from offices to shipboard. It gives the reservist a definite status. He has *his* ship. He knows where he goes at the outbreak of war. In place of uncertainty, it gives certainty.

Each ship on reduced commission, reserve or ordinary, has its fifty, a hundred, or possibly three hundred reservists to carry along, the status of whom is no more different from that of men on furlough, indefinite furlough. Each ship has its few reserve officers, their fitness and training well able to note. Compare this to the lamentable system of trying to maintain contact with 50,000 men and thousands of officers by the district headquarters method.

Does it require much vision to see how the two systems would function on the advent of war?

The new system has the advantage of little cost. It is carried on by the regular navy. It requires no appropriation except for reservists' retainer pay. It could probably be made to work with a voluntary reserve without pay.

It is easily started. Every ship in the navy can start it. They can recruit their own reserve from:

(a) Men they discharge.
(b) Men of the old reserve who have training on the type of ship.

Through the publicity agencies and other means of communicating with former reservists, the Department can recommend their enlistment on a ship, a type of which they have had training on. The original impetus given, the Department could wipe its hands of further bother about the reserve.

Reserve officers in starting the system off would have to be assigned to the various ships, care being taken to assign officers to the type of ship on which they served during the war.

The Department with due regard to the homeyards of ships can submit to each naval district a list of ships and stations to which the naval district will detail the reserve officer personnel carried on their rolls. This done, the naval districts will cease handling reserve officer personnel.

What confusion such a system would avoid, what a saving of precious time, what a saving of hundreds of yeomen and badly needed officers at the mobilization centers on the declaration of war.

At the present writing, we are confronted with the problem of a reduction of the personnel, both men and officers, possibly forty per cent of the total strength. This personnel is available for reserve organization as outlined.

Who is it that said the mark of efficiency of an armed force is the smoothness with which it passes from a state of peace to a state of war?

TRAINING OF OFFICERS

It is perhaps a highly critical eye that can find fault with the system of training and educating the American naval officer. However, if there is one fault, it is that there is nothing, if he lacks the urge in himself, to keep him a student after he has left Annapolis. Unfortunately possibly, the naval officer has never completely learned his profession from the day he enters the Naval Academy to the time he may command a battle fleet. Study is his lot whether he delights in it or not, else failure may face him in a moment not only important to himself, but to his country.

Some thought lately has been given to a "postgraduate" school of the line. Is it necessary to establish such a place ashore?

Why shouldn't on all ships and stations, except the very smallest ones, two or three hours be set aside as routine every week for lectures on strategy, and tactics, naval history, seamanship? Officers could be required to do a certain amount of study on these subjects.

It is true, I know, that something like this plan has been tried under one or two commands but there has never been any general attempt to follow the idea.

Is it well that officers should receive no training in the art of war until they approach the end of their careers?

A steady routine of one hour, two or three afternoons a week, on all ships, would not take long to inculcate the proper indoctrination in the first principles of the art of war.

The war college correspondence course will be pointed out, but what per cent of officers complete this course successfully?

What is the test of the naval officer? What means have the heads in Washington to know what the mental ability of the lower ranking officer is? Nothing usually outside of his fitness reports and examinations for promotion.

Of what do these examinations consist? Almost entirely up to the highest ranks, of nothing but questions on subjects studied at the Academy. It is a test of what the officer remembers of the Naval Academy education. Actually it is a test of what he can cram from Naval Academy textbooks and "gouges" in a few weeks' time before the examination. Careful consideration would show that in some respects, a change in the examination method is warranted.

Why shouldn't questions be introduced in the all important subjects of naval history, our own and foreign, and the lessons to be deduced from them; questions on foreign navies such as would be of value. No officer is too young to be thoroughly conversant with the history of naval warfare. Nor is any officer too young to be a student at least of the art of war and the principles of strategy and tactics.

The examinations for promotion are the only available instruments to compel an interest in their profession on the part of the indifferent. Now, lacking a good memory it simply compels a few weeks of cramming.

This is not sound.

CONCLUSION

The foregoing is not held forth as something new. In fact, it aims at the principles followed by all successful armed forces in the past.

Appreciation is not lacking of the splendid qualities of the personnel of the American Navy. From the standpoint of mechanical ability they are not excelled and probably not equaled. Of courage unquestionable, quick-thinking and resourceful, splendid stuff they are. With faults of organization eradicated and necessary training instituted, its observance rigidly enforced, a

navy of incomparable men-of-wars men will result. With the attitude that no detail in the development of personnel is too small to disregard, the men and officers of the navy will be truly a *corps de lite*. That is what they should be, and what they must be. Otherwise we are gambling with fate.

We are faced at this time with a great reduction of personnel. The reaction that has always followed a war in this country has set in. A comparative small force of us may be left. So much the greater our responsibility to keep the "sacred fires" burning.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

REWINDING A MAIN DRIVE MOTOR ON A DREADNOUGHT

By Lieutenant T. A. Solberg, U. S. Navy

In the building of electrically propelled warships it was believed that no occasion would ever arise requiring the entire rewinding of either the main generators or main motors. In the event of such a possibility, however remote, it was generally conceded that the unit affected must be removed from the ship and the work done either by the original manufacturer or a navy yard.

The remote possibility was, however, realized when number four main motor on the U. S. S. *Tennessee* was damaged on March 12, 1921, by a fire resulting from a double ground on two phases or a short circuit between phases. The damage was such as to require complete rewinding of both rotor and stator, as well as the renewal of a small portion of the stator iron laminations, which had been fused in the slots by the intense heat. After conference between the ship's officers and the Westinghouse representative on board at the time, the commanding officer requested authority for the repairs to be made on board. After conference between the Chief of Bureau of Engineering and Westinghouse representatives this request was finally approved and the work authorized on March 22, 1921. The accomplishment of the repairs in the short period of seven weeks more than justified this procedure, for any other plan would have required fully twice as much time. The work was done under the direct supervision of the contractor's service engineer, Mr. J. J. Brown, who had been in charge of the installation of the main propelling machinery on the ship. The direct labor was performed by eight winders and an iron worker, assisted by picked men from the engineer force of the ship. Four of the winders and the iron worker arrived on board on March 24, and the other four winders arrived

March 25. The work was carried on twenty-four hours a day and seven days a week. In view of the rising importance of electric drive and the interest being taken by the service in general in this type of propulsion, the more important details of the repairs made on the motor are described below.

The accident necessitating the rewinding occurred while the ship was off Guantanamo Bay making rehearsal runs for her official trials, which were to be held upon completion of the shaking down cruise.

The vessel got under way at 6:00 A. M., Saturday, March 12, and proceeded on measured mile to complete standardization runs. First run was made at 116 R.P.M., 24-pole combination, on the two outboard propellers, with the two inboard motors disconnected. The second run was to be made under the same condition except that it was to be made on the 36-pole combination. The first run had been completed and the turn made at the end of the course. The ship had been settled down following the turn for about four or five minutes and had been steaming on the 36-pole combination for about twenty minutes when at about 7:05 A. M., a loud report was heard, which, upon investigation, proved to be a short circuit with resultant fire on number four main motor. The burning insulation produced such a dense and stifling smoke that it was difficult to get near the motor even with gas masks. No provision had been made for the use of steam or fresh water connections for extinguishing a fire in the motor on account of the remote possibility of a casualty of this nature. However, later designs make provision for this casualty. The fire was confined to the air gap and although it was realized that the use of Pyrene or foam fire extinguishers or salt water was injurious to the insulation all were tried as being the only means readily available. Their effective use was prevented due to the design of the motor providing a deflecting air shield which completely covered the air gap.

As soon as this was apparent the engineer officer decided to flood the motor room. The water had already reached the level of the floor plates. At this time someone suggested going full speed with the two inboard motors, thus turning number four motor rotor by the drag of the propeller and allowing the burning rotor to be rotated through the water. The bottom of the

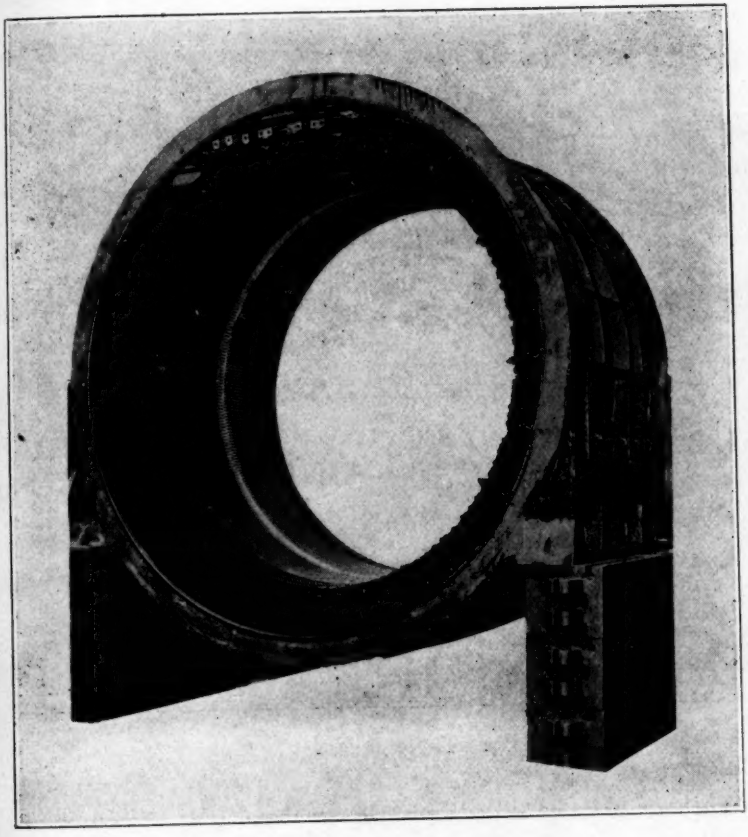

FIGURE 1—MOTOR STATOR

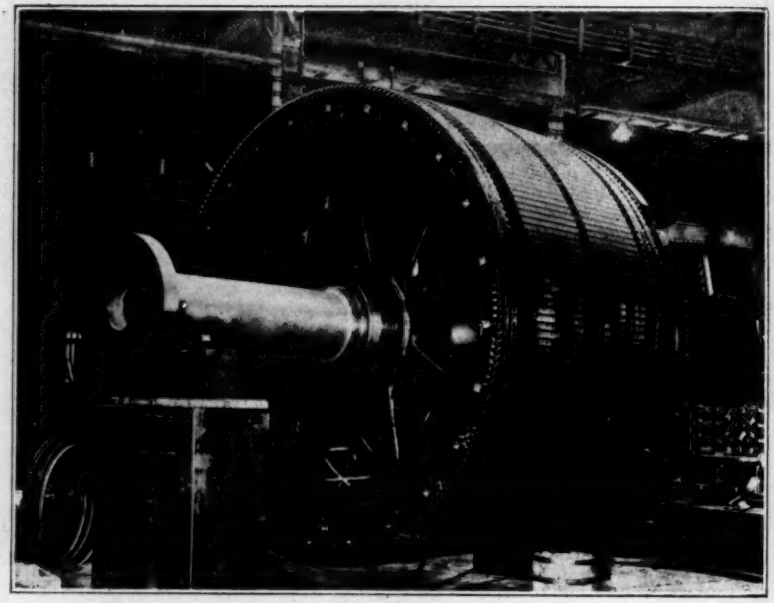

FIGURE 2—ROTOR ASSEMBLED

rotor was already immersed in the water. This was done and proved effective immediately.

There remained nothing to do but disassemble the motor to determine if possible the cause of the accident and also the extent of the damage. This inspection at once made it apparent that most of the windings must be removed and that a portion of the stator iron which had become fused must also be replaced. High potential tests later on showed that all of the windings must be renewed. Although many of the coils had not been damaged by fire, the salt water used on the fire caused them to break down on the high potential tests.

Upon disassembling an examination disclosed the following damages to the motor:

Note: There are 360 slots in the stator which are numbered clockwise as viewed from the collector end, beginning with No. 1 at the top and to the right of the vertical center line.

(a) *Minor mechanical injuries in ventilating duct of stator.*

Metal sheath around coil badly torn in slots 168, 173, and 181. Metal sheath and insulation around coil torn, but in no case very deep, in slots 116, 123, 130, 134, 155, and 261. Waste and light weight foreign matter found in air duct.

(b) *Major injuries in ventilating duct of stator.*

Copper exposed and partly burned away in 36-pole coils lying in slots 333 and 357. The adjacent steel spacer plate in the air duct also showed evidence of fusion.

(c) *Damage at the collector end of the stator.*

Insulation entirely burned off the cross connections between coils lying in slots 310 to 360.

Insulation charred on the cross connections between coils lying in slots 1 to 20.

The ends of the coils lying in slots 351 to 360 were displaced toward the shaft and the end of the coil in slot 354 was bent to the left and its insulation torn off.

(d) *Damage at the coupling end of the stator.*

Approximately three and one-half inches of the tooth between slots 353 and 354 burned off and the top coil in slot 354 completely burned out approximately eight inches forward from the end of the laminations. The bottom side of the same coil in slot 346 was also burned off well inside the slot.

The ends of the 36 pole winding lying in slots 345 to 355 were completely burned off. Parts of a few of the 24-pole coil ends directly above these 36-pole coil ends were also burned off.

Insulation entirely burned off the ends of the coils lying in slots 331 to 351.

Insulation entirely burned off the ends of eight 36-pole coils lying approximately 33 to 40 coils to the right of the vertical center line as viewed from the collector end. Insulation charred on all coil ends in the upper part of the stator where the copper was not exposed.

Two separate holes were burned through the sheet metal shield and the expanded metal screen opposite the coil ends which burned off. Flames scorched the paint on the bulkhead opposite; these holes were approximately five feet away.

(e) *Damage to the rotor.*

Solder between band wires melted at both ends of rotor but banding remained intact.

Insulation on both ends of coils damaged from mechanical injury and charred.

There was a semi-circular indentation in one air duct spacer, evidently caused by some metallic substance.

There was a slight mechanical injury to several secondary coils in air duct similar to that in the air duct of the stator.

(f) *General.*

Solder was found on ends of coils and on cross connections at both ends of the stator.

The insulation on coil ends and on cross connections was still glossy on approximately seventy-five per cent of the stator, the fire having been confined to the top of the machine.

(Fig. 1 Motor Stator)

As soon as the preliminary survey of the damage was completed the Westinghouse representative ordered a complete new set of coils, an estimated amount of new iron, and other materials which would be necessary no matter where the motor was repaired. Luckily, it was possible to use a spare half set of coils from a similar installation which was then under construction, and within a few days after the ship arrived at Hampton Roads, enough material was at hand to begin the work.

Meanwhile, enroute from Guantanamo to Hampton Roads the ship's force had made arrangements for complete dismantling of the motor so that no time would be lost in doing this, once the decision to do the work on board was made. In the small space available, this preliminary work in itself was no small task. It entailed work usually done by a navy yard.

When ready for rewinding, the motor was in the following condition: The forward bearing bracket was removed and hung on the forward bulkhead. To take the weight of the rotor, the lift-

ing gear provided an extension shaft which rested in a saddle on the forward bulkhead. The after bearing bracket was secured on the shaft as far aft as possible and the weight of the rotor ordinarily supported by this bearing was taken by a saddle block placed under the shaft and on the turning engine foundation. The ventilating ducts for the motor were broken down in sections and suspended from the deck above so as to be entirely out of the way. The housing for the motors was unbolted and raised about eight feet, the ventilating motors remaining in place on top of the housing. The stator was pushed forward on the track which formed its foundation, so that the stator was clear of the rotor. To facilitate jacking the motor an additional support for the rotor was built up under the forward journal so that the shaft rested in a "V" cut in a ten by twelve block of wood, about eight feet long. The floor plates, supporting angles and oil piping were of course removed. Considering the fact that these motors each weigh about fifty-four tons, the weight almost equally divided between rotor and stator, some idea can be gained of the work connected with the disassembling. Because of the small space available in the motor room all new material was stored on the second and third decks and brought to the motor room as required.

The actual work of rewinding was commenced March 24. The first step was the removal of the old windings. This was accomplished in three or four days. No attempt was made to save any of the old coils, and therefore, to facilitate removal, the closed ends of the coils were cut with a large bolt cutter. With the slot wedges which held the coils in the slots removed, it was then an easy matter to pull the coils which had been cut in halves. After removal they were of value only as scrap but the end connections were carefully disconnected and in most cases used again.

As soon as the old coils were removed from the rotor, work was commenced on laying the new ones. While this was being done, the fused iron in the stator was being removed. It was at first believed that in order to remove the bad iron it would be necessary to take out about one-sixth of all the stator iron. But since all the bad iron was in the top center strake, the iron worker was able by skillful work to renew this iron without removing much more than that which was in the after half of the

strake affected. The difficulty of this particular work was heightened because the stator was in a horizontal position (axially), instead of a vertical position, the latter position being used in the factory when the iron is laid. The damaged portion was also all overhead. The iron work was completed on March 31. The winders were, during this time, laying the coils of the 24 pole winding in the lower half of the stator and in the rotor.

As soon as the coils had been laid in the rotor they were wedged in place. This was delayed somewhat by lack of wedges but while a shipment of these was enroute, work was concentrated on laying the 24 pole stator windings. By careful planning and co-operation between the ship's force and the contractor, no delays were encountered and the work progressed favorably at all times. An estimate of the time necessary for each detail of the work was made and this schedule was followed throughout.

With the arrival of wedges the rotor coils were wedged in place and a preliminary high potential test made. One coil, injured when the wedge was driven, was found defective and replaced. The connections between coils for the rotor were then soldered in place and taped. A final high potential test of 10,000 volts for one minute was made and found satisfactory.

Meanwhile, work was progressing favorably on the stator windings, the 24 pole winding being already in place and the 36 pole winding well under way. Tests of each winding were made as in the case of the rotor and no defects were found. The soldering and taping of the end connections was a very tedious procedure in itself, and was made the more difficult because of the limited space, but the men from the engineer force became proficient in this and as many were kept busy taping as space would permit.

During the high potential tests of the rotor a short circuit had appeared between the slip rings on the rotor shaft, and, therefore, it became necessary to renew the insulation between these rings. This defect was caused by salt water and thereby the deleterious effect of salt water on insulation was again demonstrated. This reinsulating of the slip rings was accomplished by first removing the oil thrower of the forward bearing journal so that the slip rings could be moved enough to put the insulation in place. The oil thrower was removed by first heating with an oxy-acetylene

torch and then applying pressure with a pulling arrangement manufactured on board ship. Similarly it was replaced by heating it until it was large enough to slide into place easily. (Figure 2)

Before completion of the actual rewinding, preparations were made for the varnishing and baking of the windings. Steam coils were placed beneath the rotor and stator and in addition it was planned to use eight three thousand watt electric heaters. The rotor and stator were covered with a large awning to keep the heat localized as much as possible. It was desired to do the baking at a temperature of one hundred degrees centigrade and it would have been next to impossible to keep the entire motor room at this temperature. In addition to this it would have required a much longer time. The motor room, however, was closed up during the baking to prevent loss of heat.

The winding and taping being completed, the first coat of insulating varnish was applied. This was sprayed on and by using four sprayers, each coat was put on in from thirty to forty minutes. At the end of eight hours of the first heating it became apparent that the steam radiators were not accomplishing their purpose and in order to expedite matters additional electric heaters were installed, making a total of twenty-five three thousand watt heaters. The steam radiator coils proving leaky and insufficient were removed entirely.

The reason for trying steam originally was that it was thought dangerous to use electric heating because an explosive gas might be formed in the drying of the insulating varnish. With this arrangement temperatures ranging from ninety to one hundred degrees centigrade were maintained. Spraying was repeated at intervals of twenty hours until six coats of varnish had been applied and thoroughly baked. The spraying and baking thus consumed five days.

Work was then immediately commenced on reassembling the motor. This was accomplished in two days of twenty-four working hours.

Although great care had been taken during the repairs that no foreign substances would get into any of the air ducts or other parts of the motor, the efforts failed. A five-eighths inch washer became lodged between two rotor coils near the closed ends. As soon as the motor was kicked over a few revolutions by power,

it of course flew out and barked the insulation on two rotor and stator coils. Careful examination of the air gap while the motor was jacked over of course had not disclosed the hidden washer.

This made it necessary to disassemble the motor and repair these coils. At the same time all parts of the motor were carefully inspected by several officers and Westinghouse representatives. The work of disassembling, repairing and reassembling was accomplished in thirty hours, and this was considered a good test of the speed with which this type of motor can be broken down. In this evolution it is necessary to break the joints on the ventilating ducts, raise the ventilating blowers clear of the housing, remove holding down bolts, remove top half of forward bearing cap and bearing, rig extension shaft, break all stator and rotor leads to the motor, remove angle irons and gratings, and then slide the stator forward on its track until it is clear of the rotor. Either chain falls or thirty ton jacks may be used for the last operation. The barked coils were carefully taped, varnished and heated by means of a current of hot air and the motor reassembled.

After careful inspection of the air gap when the motor was jacked over, considerable noise was heard. This resembled the bouncing of a few small metallic particles through a small distance. The motor was kicked over several times and investigation of the inside of the rotor each time generally resulted in finding a small piece of copper or other metallic substance. These were always found near the after end, and every indication showed that they were working their way out of the axial air ducts of the rotor. This was a dangerous condition, for if any of these pieces should get in the air gap serious damage to the coils would result.

The motor was, therefore, again disassembled and every air duct, radial and axial, blown through with air at two hundred pounds pressure. This had been done thoroughly previous to the first assembling but at only 100 pounds air pressure. This had evidently been insufficient to dislodge the foreign particles. These had found their way into the air ducts when the old coils were being removed, the pieces of copper in each case being portions of the coils which had been clipped off by the bolt cutters and had then bounced into the entrance of the air ducts at the forward

end of the rotor. These openings had all been carefully closed with rags during the work of rewinding except for the first day or two when old coils were being removed.

Thereupon the motor was reassembled, the entire operation this time having required only twenty-two hours. On this trial everything was satisfactory and the following day the official trials of the ship were commenced. The motor has operated satisfactorily since that day, the ship having in addition to her full power trials and ordinary cruising steamed from New York to Seattle by way of the Panama Canal.

During the period of repair the ship proceeded to the Navy Proving Grounds and successfully carried out the test firing of her entire battery. After the test firing the ship proceeded to Boston, Mass., for docking previous to her final trials and thence to Rockland arriving there for her trials on May 12. With the repairs progressing it was possible, as demonstrated by actual runs, for the ship to steam in the open sea up to about 15 knots.

The causes of the accident were determined by a careful inspection of the motor when it had been disassembled immediately following the accident. This examination showed that the coil insulation had been mechanically injured by some hard substance. This substance may have been lodged in the rotor center air duct and when dislodged produced these injuries. The nature of the mechanical injuries indicated that some of the damage had been done during astern as well as ahead operation. Although the motor was operating ahead when the casualty occurred, a large dint in one of the rotor vent spacers was of such a nature that it must have been made during astern operation. The nature of the distortion of the stator vent spacers and the damage to the insulation indicated that the 36-pole stator winding most probably became grounded in two places, thus causing a heavy local short circuit which started the fire in the insulation of the windings.

From this it can be seen that the greatest care must be exercised at all times to prevent any foreign substances from gaining access to these motors. In order to insure against this and to prevent a possible recurrence of this casualty, all openings to all four motors were fitted by the ship's force, with new screening for their protection. The screening fitted was of heavy wire and with

mesh giving an opening slightly less than one-eighth inch, that being the air gap measurement. Formerly the screening fitted had about one inch mesh except that over the radial air duct which was about one-quarter inch.

The repairing of this motor on board ship was an interesting experiment and demonstrated the fact that major casualties to electric propulsion machinery are no more serious than parallel accidents to any other type of drive; and in addition that the repairs can be effected just as rapidly if not more so.

DISCUSSION

Industrial Organization of Navy Yards

(See Whole No. 231, Page 761)

Lieutenant P. A. Caro, (S. C.) U. S. Navy.—Commander C. W. Fisher's fine article, "Industrial Organization of Navy Yards," charges, in effect, that the present accounting system does not justify its expense from a local viewpoint.

It may be of interest to note that all of the specific objections raised by Commander Fisher have been overcome here at Charleston and that Commander Fisher himself is the greatest beneficiary of the utilization of the tools provided. The answer to the question "How?" may prove of further interest.

The present accounting administration had and has no expert knowledge of the subject, but came to the duty imbued with a keen desire to make accounting effective in every phase of its operation; i. e., to extract a full return from intelligent use of tools provided. Long observation has taught three important psychological facts concerning the personnel of the U. S. Navy.

First. There is a well defined disposition to beat the game, i. e., accomplish something (for the Navy, of course) in spite of regulations rather than use existing tools for accomplishing the desired end.

Second. A tendency to study carelessly, if at all, information shown on printed forms.

Third. A tendency to "pass the buck" in regard to paper work.

If you are going anywhere it is well to know where you are going and why. With this general principle in view heads of divisions were encouraged to criticize accounting as it existed. There was no difficulty in bringing out criticism. Those noted by Commander Fisher, and many more, were emphasized. Boiled down, the criticisms amounted to:

First. As an information service accounting doesn't justify its existence. Information is received so late that it is worthless; loses its kick in transmission. It is necessary for responsible officers to make intricate calculations before they know "where they stand."

Second. Accounting is no weapon for efficiency, for the reason that it does not give the desired information.

There the problem was fairly stated and the lines along which improvement must come were capable of expression in one word for each branch of criticism; i. e.,

First—Promptness.

Second—Scope.

PROMPTNESS

Up to this point great progress had been made in that the disease had been diagnosed and, assuming that the tools at hand were capable of more effective use, it was evident that the remedy lay in a careful study of the three psychological observations listed above.

It was apparent that the Daily Report of Appropriation Expenditures designed to show all concerned just "where they stood" was worthless four or five days after its date. Furthermore, if this report included tentative charges to appropriations which later became credits, but so much later that the credits were abortive, there seemed little need for its rendition.

The first step indicated, therefore, was a "speed up" campaign and one was inaugurated forthwith. Immediately psychological fact number three reared its head and no matter how hard one hit it, it persisted in showing. The daily report is prepared in the cost section of the accounting office. Inquiry there as to the lateness brought the reply: "We do not get the chits from the time section promptly." The time section reported that "time" did not come in from shops promptly, hence the delay. No effort had been made to determine cause of delay in shops and eliminate it. In short the attitude of the cost section was: "We get the report out in reasonable time after securing the data; delay is not with us." The time section said in effect: "We work the time up quickly when we get it and if the shops are not on the job it's not our fault." The accounting office generally said: "The Report of Expenditures is late, but it is due to the other fellow; we are doing our share and our responsibility and interest cease there." And all of these people were telling themselves and each other how good they were! The next step was a request upon officers in charge of shops to get "time" in not later than 10 A. M. on the day following that on which earned. Co-operation was so good that in less than a week it became a rare thing for "time" to come in as late as 10 A. M. The time required for various operations in preparing "Daily Report" was carefully calculated and charted; the figures proved conclusively that report could be prepared and distributed by 3:30 P. M. of the day following that on which labor and material were applied. Therefore, the office force was required to produce the report before 3:30 P. M. each day. An additional hour was saved by phoning the information to interested parties in advance of typing report.

Up to this point good, but not good enough. Interested parties were still compelled to make allowances for power charges. An investigation of the whys and wherefores of the dissatisfaction concerning power charges showed the situation to be as follows: indeterminate charges were lodged temporarily against appropriations on the basis of productive labor. At the end of the month when the true distribution was known, final charges were made—at fixed price—to appropriations, where the ultimate consumer was known, the balance invoiced into store. Calculations showed that about 70 per cent of the indeterminate cost was being

invoiced—thus operating as a credit to working appropriations, *but too late to be of any value*. Therefore, it was decided to do in the first place what had been done in the last place. Accordingly the power cost situation was carefully scrutinized, the probable percentage of cost to be invoiced into store determined and a rate somewhat lower—to guard against overexpenditure—fixed. This rate represents a percentage of the total indeterminate power cost and the percentage is shown in money each day charged to naval supply account. This leaves the appropriation expenditures and balances net for all practical purposes. A new rate is set each month after careful survey of the situation, future plans, and past cost.

The effectiveness of report was further improved by a device to take care of retirement fund deductions. Over a long period of time this was found to average 2.2 per cent. Therefore the allotments granted by the department are shown on report, but just below, in parenthesis, is shown a sum which represents allotment increased by 2.2 per cent of itself (allotment divided by .978). As expenditures are shown gross, available balance is apparent at a glance.

Special public works projects are shown separately. It is believed that report of expenditures is now as complete as anyone could desire. The information is accurate and reaches parties concerned in less than six working hours after time is earned and material applied. If anyone outside of the accounting office touches a pencil to discover "where they stand" they have a passion for figures. These items appear to cover the specific criticisms mentioned by Commander Fisher. It will be noted that the improvements were accomplished with the tools at hand, i. e., the accounting system as was and is.

The "speed up" program was not confined to daily report. Operations involved in preparing reports of expenditures, expense statements and stores returns were observed, timed, and charted. Causes of delay were determined, very much in the manner described in regard to daily report. The difficulties were taken up one by one and the work so arranged and personnel shifted that they gradually disappeared. It was realized that an expense statement for November received in January or February could be no potent weapon for efficiency or effectively indicate points of leakage.

Both reports of expenditures and expense statements are now rendered promptly.

SCOPE

With reasonable promptness assured, attention was next turned to scope. A casual study of accounting forms indicated that almost any desired information could be gleaned therefrom.

Why, then, was this information not used to promote efficiency? There is no doubt that the answer lay in the second psychological trait, i. e., the general indifference to printed forms. At this point the problem was clearly stated, i. e.: "Furnish the same information, graphically, in such form that salient points will attract quick attention. Monthly, as soon

as pencil figures are available a memorandum is forwarded to the manager in letter form, comprising a complete analysis and comparison by shops of indeterminate expense. A table is submitted showing production, expense, ratio of expense to production, number of men and supervisors by shops. This information is shown for the month just closed and the preceding month in parallel columns. A second table shows principal items of expense, such as leave, supervision, etc., by money expended and percentage of total expense in parallel columns for the months concerned. Other tables compare total expenditures for all purposes, total production and ratio of indeterminate expense to production. The tables are supplemented by comment offered for the purpose of emphasizing seemingly undue expense, and suggestions as to remedy. Sometimes other points are covered. For instance, stores balance sheets, or fixed expenses, are analyzed and compared with production. This gives the manager by the middle of the month a complete résumé of the previous month's business and compares it with that of the month before. This information indicates shops which are carrying a heavy burden of expense and also indicates whether or not the expense were avoidable.

There is a strong tendency in the navy to slight the tools provided. The writer has frequently seen naval people pick out some law or regulation which prohibits this or enjoins that and spend valuable time devising ingenious schemes to "beat the game," i. e., "get around it." Several of these cases have been privately investigated—experimentally—with the result that usually an easy quick way of accomplishing the desired purpose has been found "within the law."

The accounting service is not perfect, but it is certainly capable of more productive use than is being made of it. Many fine tools are provided. Alexander did not sever the Gordian knot with the back of his sword.

A Program for Naval History

(SEE WHOLE NO. 232, PAGE 973)

CAPTAIN ROBERT H. WOODS, (S.C.) U. S. NAVY.—I read recently in the June number of the NAVAL INSTITUTE PROCEEDINGS the article entitled "A Program for Naval History" by Captain J. M. Scammell, Inf. R. C., U. S. Army. The author in certain of his statements in regard to the *Records of the War of the Rebellion* shows such gross ignorance and casts such an unwarranted slur upon the compilers of those records that I cannot let his article pass unnoticed.

To begin with, he has missed the conception and object of the publication of those records. They were collected and published with the express purpose of preserving them for all time so that historians throughout the country could have easy access to them and could use the official facts on which to base their conclusions; in other words, the source from which to write "the intelligent history" so devoutly desired. No greater or more useful publication for this purpose has ever been issued by any government. They were never meant to be history, but simply official facts on which to base history. If such a commission of military and

scholarly experts (as suggested by Captain Scammell) had been authorized to prepare a staff or military history of the Civil War from the original official records, scattered as they were throughout the country and in thousands of volumes in the various government departments, it would have taken them a hundred years to have searched out their facts, and by that time many of the original records would have been lost or destroyed, leaving the experts nothing to back up their facts and conclusions.

The author states on page 976 as follows:

"During the period when the wicked general staffs were producing their militaristic literature, with our customary virtue we were engaged in publishing our own military records in such a manner as to render them useless for any warlike purpose. The *Records of the War of the Rebellion* were printed at a monumental cost. What could have been and should have been a priceless collection was turned into an abortive effort because the publication being a political maneuver and not a scholarly or military undertaking, was entrusted neither to scholars nor to military men, but political appointees. The manner in which such things are done by our government is in exasperating and pathetic contrast with the intelligent methods of any other state. One collection bears this notice:

"'Edited by the clerk of the joint committee on printing.'"

In the next paragraph the author compares the futility of the *Records of the War of the Rebellion* with ponderous labors—worse than useless; historically false. The above statements are without foundation and unwarranted in almost their entirety. The *Army Records* were published by a Board of Publication, the head of which was always a high military officer of the regular army, among whom were Colonel Scott, Major George B. Davis, and Major George W. Davis—all distinguished and scholarly officers and men. To insure the impartiality of the work, distinguished participants of both the Union and Confederate Armies were employed on the work, among the latter being General Marcus J. Wright, General L. L. Lomax, and General Field, all men of high military and scholarly attainments. Two other members of the Board of Publication were civilian appointees: these men were selected for their thorough knowledge of and familiarity with the records of the War Department; but the guiding hand was the military head of the Board.

The preparation of the *Naval Records of the War of the Rebellion* was begun under Professor James Russell Soley, U. S. Navy (afterwards Assistant Secretary of the Navy under Secretary Tracy), a distinguished graduate of Harvard, a man of scholarly attainments, and one of the best informed men on naval history and international law in the country. He was succeeded by Lieutenant Commander F. M. Wise; he, by Lieutenant Commander Richard Rush; and he, by Professor E. K. Rawson—all of the U. S. Navy. The work of publishing *Naval Records* was begun under Lieutenant Commander Rush. As I claim the entire

responsibility for the plan and arrangement of the publication and the accuracy of those records up to and including Vol. 8, I feel that it is necessary to state my qualifications for the position and how I obtained it. I am a graduate of the U. S. Naval Academy, and was legislated out of the navy under the Act of Congress of August 5, 1882, which permitted only the first ten of each class to be taken into the service. Professor Soley, in order to get a Naval Academy graduate as principal clerk on this work, prepared an examination covering almost the entire naval technical course at the Naval Academy. The examination was held by the Civil Service Commission and thrown open to the public; it lasted five days; though many started it they dropped out very fast; only two passed, both Naval Academy men; I passed far ahead on the examination and received the appointment. Politics had nothing whatever to do with it. Besides myself there were sixteen other Civil Service employees engaged on this work and an ex-Confederate naval officer for the collection of the Confederate records scattered throughout the South; but aside from copying and verifying from the original records and proof reading and indexing the volumes when printed these employees had nothing to do with the work. The work of selecting from the vast mass of records, collating, arranging and proof reading for technical errors was done by myself alone. After I gave up this work in 1898 and entered the Pay Corps of the navy my place was taken by Mr. Charles W. Stewart, a graduate of the U. S. Naval Academy, Class of 1881. Politics had nothing to do with his appointment. He is one of the best informed men on naval history in the country. Later on he was put in entire charge of the work and brought it almost to its completion.

In closing I have to state that none of the volumes of the army or navy *Records of the War of the Rebellion* bear any such notice as "Edited by the Clerk of the Joint Committee on Printing."

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Membership Life, regular and associate, 4818.
New members, 13. Resignations, 10. Dropped, 2.

Deaths, 3: Rear Admiral U. Sebree, U. S. Navy;
Lieutenant P. K. Presnell, U. S. Navy;
Ensign Frank Miller, U. S. Navy;

Practically the whole service receives the benefit of the PROCEEDINGS, yet many officers who read it monthly are not members, and therefore contribute nothing to the support of the Institute.

Members are requested to urge non-members to join. Publication costs are now so high that the Institute is carrying a loss. The loss, however, decreases with an increase in membership.

Special Notice Checks payable by banks in Cristobal, Panama, Pearl Harbor, Honolulu, Haiti, Santo Domingo, and Colon are liable to a collection charge of twenty-five cents.

In using these checks for remittances payable to the Naval Institute please add twenty-five cents to the debit amount as the Institute has to pay these charges.

Dues The annual dues ($3.00) for the year 1922 are now past due.

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PROFESSIONAL NOTES

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VESSELS BUILDING — France 1547
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FRANCE

THE 1923 BUDGET.—The 1923 navy budget is the most important since the Armistice. A slight effort is being made to regain lost time, as well as a timid attempt at cutting down useless expenditure. Whereas 798,000,000 francs make up the total navy expenditure in the current year, no less than 1,122,000,000 francs are to be spent on the fleet in 1923, including 329,500,000 francs for the preliminary shipbuilding programme. In truth, that sum is large only on paper, when is considered the tremendous cost of labor and building materials in France.

France, which was in 1914 aiming at possessing a fleet of 28 battleships, 10 scouts, 52 destroyers, and 94 submarines (Lapeyiére programme), may safely be considered to have finally given up competing for line-of-battleships and weight of broadside excellence, partly as the result of the financial difficulties caused by Boche devastations and partly also as the consequence of the great change in the minds of experts as to the war value of heavy armourclads. The half-completed 25,400-ton *Normandies*. which France discarded long before the Washington Disarmament Conference, have every chance to be the last French battleships. Fast cruisers, powerful and swift contretorpilleurs and torpedo-boats, together with swarms of underwater and aerial mosquitoes, such are the branches of construction in which France means to excel. Her efforts are to be centered on weapons that can be manufactured in a few months, and not in a few years, and that are susceptible of being multiplied during a protracted war. In this respect the lessons of the last conflict have not been lost, and by degrees French dockyards will adapt themselves to the new requirements. Thus it has been decided that Lorient and all other arsenals are to be equipped for submarine construction, and, next year, for the making of aerial weapons as well. The great war has demonstrated the faculties of adaptation of Gallic "chantiers,"

and in the light of the 1914-18 experience the *fait nouveau* has to be faced that the power of navies is measured, to a large and growing extent, by the capabilities of their yards and factories. The recognition of this truth is the main argument of those who oppose the proposed reduction in the number and importance of state arsenals, of which there are more here than in England.

The 600-ton and 14-knot submarines "de moyenne patrouille" will be called *Siréne, Ariane, Circé, Calypso, Naiade, Ondine.* The first-class submersibles of 1,000-1,100 tons and 16 knots (two 1,400 h.p. motors) will be known as *Requin, Morse, Narval, Dauphin, Marsouin,* and *Soufleur.*

The torpilleurs of 1,400 tons, 30,000 h.p., and 32.5 knots, four 4-inch guns, two anti-aerial 75 mil. and two twin 22-inch torpedo-tubes, will be designated *Bourrasque, Cyclône, Mistral, Orage, Ouragan, Sicque, Sirocco, Tempête, Tramontane, Tighbe, Typhon, Tornade.*

The 2,500-ton destroyers (48,000 h.p., 35.5 knots, six guns of 4-inch, two of 3-inch, and six 22-inch torpedo-tubes, five boilers, and a radius of action of 2,600 miles at 18 knots), will be named *Jaguar, Panthère, Léopard, Lynx, Chacal,* and *Tigre,* which are new appellations. These contretorpilleurs will be strongly built for ocean work, and reproduce the good points of the ex-German *Senès,* but if the 4-inch caliber is retained (instead of the new 130 mil. type at one time proposed), they will be dangerously inferior to the fine Italian *Leones,* that carry up to eight guns of 4.7-inch and have, besides, reached 37 knots on trial. Still, Paris experts have, apparently, special reasons to maintain that the French *Jaguars* represent the most powerful type of destroyer designed up to date.

Lastly, the cruisers of 8,000 tons (100,000 h.p., eight boilers, 34 knots, a radius of action of 4,875 miles at 15 knots, eight long caliber guns of 6-inch bore in twin armored turrets, four 3-inch guns, and twelve 22-inch torpedo-tubes) have been named *Duguay-Trouin, Lamotte-Piquet,* and *Primauguet,* that are old naval appellations, reviving some of the most glorious names in maritime annals.

The 1923 budget provides also for the modernizing of all dreadnoughts in service, that are becoming new ships so far as the range and other capabilities of their guns and torpedo armament are concerned, and also their fitness to resist submarine explosions. Aerial fire control and defence against submarines and seaplanes have received special attention as well as wireless signalling appliances. This rather heavy item of expenditure is being criticized as coming too late in the day to much improve the French naval situation. Just over 7,400,000 francs are earmarked for the continuation of artillery experiments afloat and ashore, the main tests to be with 18, 9.4 and 7.6-inch calibers and with new types of shells for future ships. A new testing range for supercannon is being prepared in the Landes "department," along the seashore. Experiments will also go on with coastal guns, mostly in the Toulon school, pending the adoption by the Chambers of the new "Défense des Côtes" programme.

The aeronautical expenditure, from 37,000,000 francs in 1922, is raised to 62,000,000 francs in 1923; thus a substantial increase is made that is justified by the urgent need of new seaplanes, new hangars, and also of more intense training. The fitting of the *Bearn* as a seaplane carrier is not included in this outlay. The ex-Zeppelins *Dixmude* and *Mediterranée* are to be used as training schools for the dirigible personnel. Extra pay is to be allowed to the flying personnel. Moreover, Minister Raiberti is understood to be giving the finishing touches to a "programme aéronautique d'ensemble," intended to make up for the actual weakness of France on the water.

A sensational cutting down had been announced of the unmilitary expenditure, but few economies have as yet been realized, when compared with the retrenchment observed in the British navy. Tribes of blood-sucking parasites keep on weakening the Marine Francaise, that counts over 36,000 civilian employés, of whom 30,000 are arsenal workmen; 9 ports militaires and naval factories, 95 flag-officers (of whom 50 are non-fighting), which is truly out of proportion with a combatant personnel of 55,000 and a fleet of seven battleships in full commission. It is intended to bring down the number of arsenal hands to 26,000 in 1923, to suppress Rochefort, and reduce Cherbourg, Lorient, and Bizerta to the rank of secondary bases, only keeping Brest and Toulon as "ports militaires de premier rang," but, in the light of past experience, the electoral considerations that govern the Republican navy will not permit these reforms to be realized.

Activity prevails in the French fleet. Long-range artillery tests by day and by night have been going on both on the Brittany coast and in the Middle Sea, and gratifying results obtained, showing Gallic canonniers are retrieving their traditional excellence. The thickly-armored *Prinz Eugen* was in a few minutes, at 16,000 yards, sent to the bottom by the 12-inch salvos of the battleship *France*. The submarine force is giving proof of seaworthiness and endurance, and there are signs that the initiative of submarine commanders is being developed perseveringly. Sea practice is being acquired by all classes of units. The 12,600-ton armored cruiser *Michelet* is showing the flag in the Baltic, the *Ferry* is commissioning at Bizerta for the Indian Ocean, and the 4,200-ton and 26-knot *Colmar* is replacing on the Far Eastern Station the worn-out *Montcalm*. The aeronautical stations are being attended to and strengthened, the obvious will of Minister Raiberti being to have in hand a really war-worthy fleet. —*Naval and Military Record*, 21 June, 1922.

THE "BÉARN" AS A SEAPLANE CARRIER.—What is the best type of seaplane-carrier? Toulon experts, who are giving the last touches to the designs of the aerial installations in the seaplane-carrier *Béarn*, after lengthy tests, are satisfied that she will prove a splendid seaplane platform, owing to her size (190 mêters long, 30 wide) and to the ample space provided for scouting and bombardment seaplanes of the various types, for repairing workshops, and for bomb and oil stores. The worth of a seaplane-carrier is, in the first place, expressed by the number of fully-equipped fighting planes which she can put into the air, whereas tiny mother ships of the *Bapaume* type (800 tons, 75 mètres, deckplace reduced by superstructures), carrying three or four small planes, are of little use for offensive work.

The value of high speed is a controversial matter. The *Béarn*, with her 23 nominal knots (certain to be exceeded in practice), will do either for service with the battle squadron, which she would considerably strengthen, or for independent work in the Middle Sea, in which case she would be escorted by seaplane-carrying cruisers. Of course, she will be made unsinkable as far as technical developments permit. Her speed, besides, would enable her to avoid too close contact with battleships, as there are only pre-war dreadnoughts in the Mediterranean more or less inferior to their paper speed. In the mind of enthusiastic aerial experts the *Béarn* type, with a bit more speed, is the fighting ship of the future. The fine British super-dreadnoughts that visited Toulon they consider in the way of targets, whereas the British seaplane-carrier squadron is to them a matter of wonder and admiration; and they insist that seaplanes, however reduced in size or in number, ought to be part of the armament of all warships, submarines included.

With the coming of the summer the aerial fever has seized the whole of France, extending also to the navy. Aerial fêtes are preparing or

taking place in a dozen centers at once, with the co-operation of those efficient aviation regiments that are the spearhead of the French army. Toulon and Bordeaux have also seen naval aviators at work, in speed, machine-gun, and bombing contests, and if *La Brise*, the Pornichet-St. Nazaire Journal, is to be believed the *côte d'amour* seaside resort is also to witness this summer an impressive aerial pageant by fleet aviators. Growing public interest in aviation, fruitful emulation between seaplane manufacturers and motor makers, more pupil aviators—such are the results expected. From several sources of information it looks as if this year would mark sensational strides in the speed and carrying power of flying machines, which will mean further changes in the conditions of warfare.

Great satisfaction reigns at Rue Royale concerning recent results obtained in aerial and submarine torpedo practice as well as in gun tests. At a range of about 14,000 yards in hazy weather, off Toulon, 25 shells of 540 kilos fired by the *Bretagne* transformed the ex-*Prinz Eugen* dreadnaught into a helpless wreck, her belt smashed in, a turret destroyed, a funnel gone. Lieutenant Pelletier has just flown without stop from Tunis to Paris in a *Breguet* fitted with a 300 h.p. Renault motor, a far-reaching performance.—*Naval and Military Record*, 19 July, 1922.

COASTAL MOTOR BOAT FOR FRENCH NAVY.—Whatever may be the ultimate decision as to the employment of light craft in naval warfare of the future, there can be little doubt that the class of small high-speed torpedo vessels propelled by internal-combustion engines, and known as coastal motor boats (or more familiarly as C. M. Bs.), will play an even more important part than they did in the last war. The form of hull employed in these vessels, which are of the skimming type, was developed by model experiments carried out by Sir John I. Thornycroft over a period of ten years or so prior to the war, the object being to produce a form having a very low resistance combined with good seagoing qualities. Tank experiments alone were not sufficient to determine the best proportions and form, and actual boats which were built and tried at sea by Sir John's son, Mr. Tom Thornycroft, played an important part in the developments. The boats of this class constructed before the war, however, were only employed for racing and experimental purposes, carrying not more than two or three men, and just sufficient fuel for the completion of a race. Considerable modification was therefore necessary to render them suitable for carrying one or two torpedoes, each weighing about 15 cwt., as well as the fuel supply necessary to give a useful radius of action, the crew of three or four men required to work the boat under war conditions, and the discharging gear for the torpedoes. However, at the period of the war when Admiral Sir Henry Jackson was first sea lord, it was decided that motor torpedo boats should be built, and Messrs. John I. Thornycroft and Co., Ltd., whose London address is now Thornycroft House, Smith Square, S. W. 1, were given instructions to build, as quickly as possible, twelve experimental boats of the special form of hull to which reference has been made. Further experiments were carried out, and the designs prepared for 40 ft. and 55 ft. boats, of which a large number was eventually built by Messrs. Thornycroft themselves and several other firms acting as their sub-contractors from 1915 to 1918.

A full account of the exploits of these vessels would form extremely interesting reading, but the utmost secrecy was naturally observed regarding their construction and employment during the war, so that, for a considerable period, the general public was quite unaware of their existence. Very little has been published on the subject since the conclusion of hostilities, but it is now known that the vessels were first employed in the winter 1916-17 at Dunkirk, from which base they were

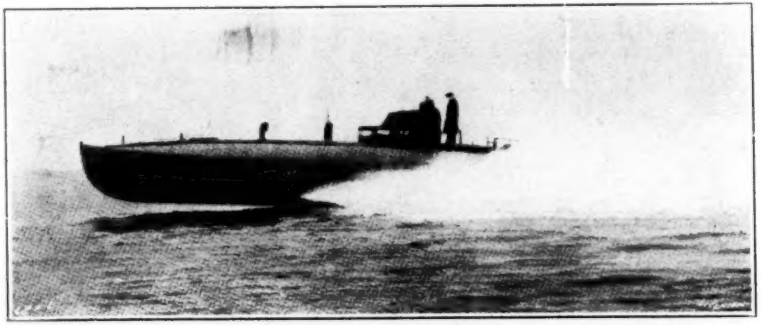


FIG. 1

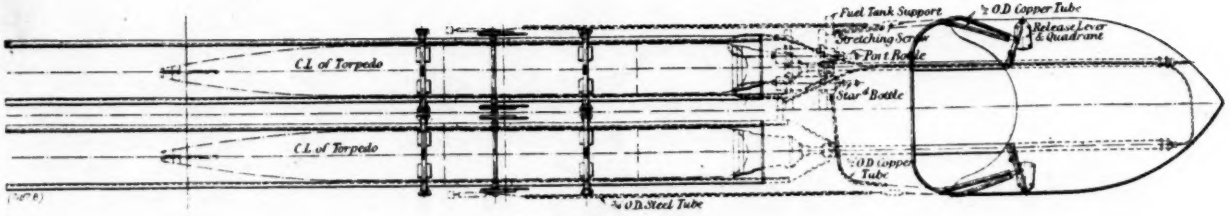

Fuel Tank Support
½ O.D. Copper Tube
Release Lever & Quadrant
Stretching Screw
Pin t Bottle
Star d Bottle
C.L. of Torpedo
C.L. of Torpedo
O.D Copper Tube
¾ O.D. Steel Tube

FIG. 2

frequently in action with German patrol boats and destroyers. For work in the North Sea they were based at Harwich, and armed with depth charges, as well as with torpedoes, were effectively employed in countering the submarine menace. They were also used for laying mines in positions which were inaccessible to ordinary mine-laying craft. More striking, however, was their work in connection with the blocking actions at Zeebrugge and Ostend in 1918, and, after the armistice, in the attack on Kronstadt. It will be remembered that the Russian cruiser *Oleg* was first torpedoed by a coastal motor boat outside Kronstadt Harbor and that afterwards several Russian vessels were destroyed in the harbor itself in an action that was unique in naval history.

That the possibilities of coastal motor boats are now being considered by other naval powers may be gathered from the fact that Messrs. Thornycroft have received orders for them from the French, American, Japanese, and other governments, so that the particulars of their design and construction we are now able to publish should be of considerable interest. The boats built for the French, American, and Japanese navies are practically identical with those employed by H.M. navy during the war. In all, four sizes have been developed and built, two being 40 ft. and 45 ft. in length respectively, and each carrying a single torpedo; one 55 ft. in length carrying two torpedoes, and one 70 ft. in length carrying three or more torpedoes. The majority of those built have been of the 55 ft. type, and it is a boat of this size, supplied to the French government, that we are about to describe in detail. This boat is designed to carry two 18-in. torpedoes and two depth charges. Mountings for two Lewis guns are also provided, mainly for the purpose of resisting aerial attack. The other main dimensions of the hull are: Beam, 11 ft, and draught, 3 ft. 3 in., the latter figure, of course, being taken when the boat is at rest. When travelling at full speed, the whole of forward portion of the hull is above the water level, the boat then being supported by the dynamic lift supplied by the inclined surfaces formed by the step amidships and the extreme after end of the hull. The draught in this condition is only a few inches, as will be gathered from Fig. 1, which shows the boat travelling at 41.6 knots—the mean speed attained on trials in the fully-loaded condition.

* * * * * * * *

Before describing the torpedo-releasing gear it should be explained that one, or both, of the torpedoes is discharged over the stern of the boat, while the latter is travelling at full speed in the direction of the objective. As soon as the torpedo is launched, the course of the boat is altered so that it clears the objective, and the torpedo, of course, continues to travel in the original direction. It will be understood that there would be no danger of the torpedo striking the boat itself, even if the course of the latter were not changed, since the torpedo sinks to a depth of about 6 ft., and would therefore easily pass under the hull. Moreover, the speed of the torpedo does not greatly exceed that of the boat, so that a considerable time would be required for the former to catch up. To assist in aiming the torpedo, the director gear indicated in Figs. 1 and 2 is provided on the steering shelter. The gear consists of an arm carrying a pointer and moving over a graduated quadrant.

* * * * * * * *

When the boat is to be used for mine-laying, the mines are carried in the torpedo troughs, as indicated in Fig. 2, and this illustration also shows the sling plates provided for lifting the boat out of the water and carrying it on a larger vessel. The sling plates are fitted at the after end only, the forward end being supported by a wide canvas band.

* * * * * * * *

Having now completed the description of the main features of the vessel and its equipment we may conclude our article by a brief reference to the voyage made from Westminister to Cherbourg on December 7 and 8 last, when the boat was delivered to the French naval authorities. Personal references are usually undesirable in a technical description, but we think it is of sufficient interest to refer to the fact that the boat was navigated to Cherbourg by Lieut. J. W. Thornycroft, R.N., the grandson of the designer, who was himself running the trials of his first torpedo boats there 45 years ago. The boat left Westminister Pier at 11.45 A. M. and arrived at Dover at 2.6 P. M., the intervening distance of 82 miles having been covered in 2 hours 21 minutes; the mean speed was therefore 34.9 knots. The next stage of the journey, from Dover to Portsmouth, a distance of 106 miles, was covered in 3 hours 5 minutes, the mean speed on this stage being practically the same, viz., 34.4 knots, although a heavy swell and some fog were encountered *en route*. The journey from Portsmouth to Cherbourg, 77 miles, was completed when strong tides and a rough sea, which became worse as the French coast was reached, had to be contended with. The time taken for this part of the journey was 2 hours 30 minutes, giving a mean speed of 30.8 knots. The total running time for the whole trip of 265 sea miles was thus 7 hours 56 minutes, and the average speed from Westminister to Cherbourg comes out at 33.4 knots. This, we think, is a very creditable performance and is effectual evidence of the seaworthy character of the boat.—*Engineering*, 5 May, 1922.

GREAT BRITAIN

EDITORIALS ON AIRSHIP POLICY.—It appears from an announcement in *The Times* that official interest in the future of the airship has suddenly revived. Both the admiralty and the air ministry are understood to have signified their willingness to set aside funds for lighter-than-air craft development, and to lend financial support to the Burney scheme for establishing an Imperial airship service.* The air ministry wishes to retain this control in its own hands, whereas the admiralty are believed to have made their offer contingent upon the transfer of such control to them.

A Substitute for Cruisers?

According to *The Times*, the Admiralty propose to find the money for airship development by taking part of the funds already voted for light cruiser construction. As no new light cruisers have been laid down or authorized since the armistice, this can only mean that the completion of the few remaining vessels of the war program is to be retarded. They are four in number, viz., *Frobisher*, *Effingham*, *Enterprise*, and *Emerald*, but all represent types to which naval opinion attaches great importance. On the other hand, if the admiralty consider airships to be needed more urgently than additional light cruisers, they would, of course, be justified in substituting the former for the latter. It is a mistake to suppose that the board has ever viewed airships with disfavour.

It was undoubtedly the influx of officers from the Grand Fleet at the end of 1916 that led to the vigorous policy of airship construction which was adopted in the following year. During his tenure as Commander-in-Chief Lord Jellicoe conceived a high opinion of the Zeppelin as a naval scout, and, as he states in his book, "The Grand Fleet," he regarded one of these vessels as equivalent in value to three light cruisers for reconnaissance in favourable weather conditions.—*Naval and Military Record*, 21 June, 1922.

* These funds were refused after the Burney scheme had been investigated by a committee.—Editor.

Lord Lee, first lord of the admiralty, addressing the 1920 Club in London on Thursday, said there was a class of enthusiasts who were, he thought quite mistakenly, at the present time depreciating the navy, and who had an extreme enthusiasm for air development.

"And here I am most anxious not to be misunderstood. I am not referring to the legitimate and long-overdue development of the air service. I have always been an enthusiast for the development of the air service, but I am referring to those wild and reckless statements that have become the occasion of journalistic stunts, and which are prevading a section of the press to-day, based on no scientific fact, but merely on a desire to be sensational.

"It is certain that the admiralty and the navy are not opposed to the development of the air service, but they are crying out for it, because the air service to the fleet has become quite as vital as the torpedo. We cannot be accused of trying to hold back, but the navy must have control over its air service. The air service is as much a portion of the fleet and should be as much under its direct control as the gun or the torpedo.

"The only complaint that the admiralty have to make against the air service is that, firstly, it is not developing fast enough, and, secondly, it is not under the control of the fleet. The air service should not be developed at the cost of the proved and tried weapon on which we have had to rely in the past, and on which we shall have to continue to rely."

Not a Substitute for Navy

He wanted to make it clear that the air service, however well developed, could never be a substitute for the navy. Food could only come safely overseas during war under the guardianship of the British navy. If the extreme contention of the air enthusiasts were accepted, that the battleship was no good because it could be sunk by one bomb, he could only say it was not supported by any evidence of a scientific nature. If they carried that argument to its logical conclusions, no ships could float the seas during an air attack. The aircraft carrier, the cruiser, and the merchantman would all be sunk.

"I do not underestimate the value of the air service, but, believe me, it does not spell the end of the British navy. The admiralty claims today that it has already discovered and embodied in a design an antidote for all these new methods of attack, whether by torpedo or by bomb. We are not in the least anxious about our position so long as we are allowed to go on with our work."

Defending the action of the admiralty in proceeding with the building of the two new post-Jutland battleships, Lord Lee said that to talk about the maintenance of our naval position as so much sentiment was surely the most rank and stupid heresy that could be imagined. Those who said that there could be no more wars were tempting providence, and taking risks which no one had the right to take.—*Naval and Military Record*, 19 July, 1922.

It has taken a prolonged and vigorous press campaign to rouse the air ministry from its lethargy and open its eyes to the fact that we are now confronted with a situation that even the Secretary of State for Air does not regard "without feeling grave alarm."

There are signs that the admiralty, who have long chafed under the anomalous system which denies them any real control over their own air service, are at last in open revolt. The first lord made a very outspoken speech at the 1920 Club last week, insisting that the navy must run its own air service, which had become as much an integral part of the fleet as the gunnery or torpedo branch. The admiralty's complaint, said Lord Lee, was, first, that the flying service was not developing fast enough, and,

secondly, that it was not under the control of the fleet. This, of course, is no new revelation, and to those who are familiar with the facts it has been a matter for astonishment that the admiralty should for so long have acquiesced in an arrangement which makes it utterly impossible to build up an adequate and efficient air service for co-operation with the navy.

The whole trouble is that the navy's air requirements are to a large extent dictated and controlled by men who are either soldiers themselves or influenced by military service, and who are consequently unable to grasp the fact that an almost fundamental difference exists between the functions of naval and military aircraft. In the opinion of the navy the principle of a unified air service has been utterly discredited by experience and should be scrapped without further delay.

The breach between admiralty and air ministry has now been widened by the latter's dog-in-the-manger attitude towards the question of airships. According to *The Times*, it takes the line that if it cannot control airships itself it is anxious that no other department should have them, while the admiralty, on their part, attribute so much importance to the provision of airships that they are prepared, if the Burney scheme falls through, to build such vessels at their own charge. The crisis which has now arisen will indeed prove a blessing if it results in the emancipation of naval aviation from military leading strings. It is true enough, as we recently reported, that a fairly generous percentage of the money available for experimental building has been devoted of late to naval type machines, but unfortunately the air ministry has been spending so lavishly on ground establishments that funds for other purposes are exceedingly restricted, and the present flying equipment of the navy is quite inadequate even for the minimum requirements of peace training.—*Naval and Military Record*, 12 July, 1922.

Public confidence in the government's air policy has been rudely shaken by last week's disclosures as to the plight of naval aviation. That the fleet was short of planes and pilots had long been common knowledge, but few outside the service can have realized the full extent of the deficiency. The figures given by Mr. Amery on Wednesday are positively appalling. For the entire British navy, which includes 15 capital ships in full commission, only six fighting aeroplanes are available, and, according to Viscount Curzon, it is more than doubtful whether these six are still intact. The only other machines attached to the fleet are 18 reconnaissance planes, 12 torpedo planes, and 18 spotting planes, It must be obvious to the merest tyro that these figures bear no relation whatever to the actual requirements of the service in respect of air material, even in peace time.

With such a shortage of machines it is quite impossible to work out any useful scheme of co-operation between surface ships and aircraft either for offence or defence. There has been, for instance, a great deal of talk about the possibilities of long-range fire controlled by aircraft, but we very much doubt whether any thing can be done in this direction until the number of spotting planes is largely increased. Then, again, the public had been led to believe that the development of the torpedo plane was receiving great attention, whereas it turns out that the navy has only a dozen machines of this type. But the dearth of fighting machines is by far the most serious matter, as a moment's reflection will show, for it threatens the very foundations of our post-war naval policy by raising in a form more acute than ever the question as to whether it is desirable to spend so much money on maintaining battleships in commission and building new ones.

Not Enough Fighting Planes

Since aircraft have admittedly become a serious menace to surface ships, the perpetuation of great ships costing £8,000,000 apiece and carrying upwards of 1,200 officers and men can be justified only on the assumption that they will be adequately protected from the attentions of hostile aircraft, protection which can only be given by other aircraft. The chief function of the fighting plane is to drive off or destroy enemy aeroplanes which may attempt to attack the fleet with bombs or torpedoes. We think it will be admitted, even by the warmest partisans of the great ship, that a battle fleet sailing in enemy waters without an adequate force of fighting planes would find itself in a very precarious situation if attacked by heavy bombers and torpedo-carriers. It may, of course, be argued that the navy's aviation service would be promptly reinforced in the event of war, but in view of the virtual collapse of the aircraft building industry it is more than doubtful whether this could be done in time. The main point is, however, that the navy has been badly let down by the air ministry, and is now rightly insisting on the deliverance of its air service from the paralyzing grip of incompetent bureaucrats.

The announcement of the formation of "two air defence brigades, territorial army, for the defence of London," leaves us quite cold. No amount of ground troops equipped with 3in. guns would avail to guard London or any other city from air bombardment if we ever again found ourselves at war with a great Continental Power. It is difficult to resist the suspicion that this announcement has been made to distract public attention from the real issue. Many of the newspapers and of those people who write letters to them exhibit a touching faith in the future of civil aviation, upon which, they declare, we must rely as the surest means of building up an air fleet available for war service. But irrespective of the limited utility of civil machines for war work, there remains the notorious fact that our civil air fleet, never of large dimensions, is steadily shrinking. Last month it comprised only 83 machines of value for war purposes, according to the air ministry's statistics. Clearly, therefore, civil aviation is a broken reed so far as its value for national defence is concerned.

No public man seems to have the courage to tell the nation what it really needs and what eventually it must have—that is, an independent air force consisting of say, 1,000 machines specially designed for war service, with the necessary personnel, equipment, etc. The possession of such a force would make us reasonably safe from aerial attack, since no neighboring power would be likely to send bombing machines over our cities if it knew for certain that retaliation on at least an equal scale would swiftly follow. No doubt it would cost a great deal of money to create and maintain in England a standing force of 1,000 aeroplanes —including several hundreds of the heaviest bombing machines—in addition to all the other aviation material required for special navy and army service, but it is an expenditure that will certainly have to be faced sooner or later. When all is said and done, we pay out vast sums each year for the upkeep of naval and military forces which are intended solely for defence and not expected to make any direct contribution to the commerce and industry of the realm. Why, then, should the provision of an adequate air fleet always be made contingent on the development of civil aviation?—*Naval and Military Record*, 19 July, 1922.

BRITISH AIR FORCE TO HAVE 500 PLANES.—London, Aug. 3.—Great Britain has decided to provide a home defense air force of 500 airplanes, Premier Lloyd George announced in the House of Commons this afternoon.

It has been decided further to spend an additional $10,000,000 annually to protect England from the air.

A large section of the British press has been clamoring for weeks for government action to strengthen the air defenses.

The *Daily Express* from time to time has been printing powerful editorials on the first page stating that Great Britain is practically defenseless in the air.

It was pointed out by the newspapers and by officials of the army and navy that France is the only nation in a position to attack Great Britain by air, and all were very careful to say that no danger is felt from that quarter. It is this circumstance which adds mystery to the public demand for strengthened air defenses.

There is one section of official opinion which believes that "the next war" will be won through a combination of air and chemical weapons. Those holding this view think that airplanes will be perfected to the point of silent flight and that large squadrons of them will be able to drop bombs containing poison gas which will wipe out not only armies but the civilian population.—*Baltimore Evening Sun*, 3 August, 1922.

Developing the Aircraft Carrier

All the principal admiralties of the world are paying marked attention to the provision of aircraft carriers, a type which is now regarded as only second in importance to the capital ship, some naval experts both here and in the United States believeing it to be even more indispensable. The American navy contains as yet only two carriers, one a converted fleet collier and the other a rebuilt cargo steamer, both of which suffer from the drawback of low speed; but plans have now been prepared for the transformation of two huge battle cruisers into floating aerodromes. The ships in question, originally designed on a basis of 43,500 tons and a speed of 33¼ knots, are to be cut down by some 11,000 tons, with corresponding modifications in armament and armour, and fitted with spacious flying decks. Their great dimensions, 874 feet over all, with a width of 101½ feet, render them well adapted to this new rôle, though some critics consider it bad policy to employ vessels of such enormous size and cost for work that is bound to prove extremely hazardous in war-time.

Japan is pursuing the same policy, for she is now busy converting the two 43,500-ton battle cruisers *Amagi* and *Akagi* into aeroplane carriers, the displacement in each case being reduced to 26,500 tons. These vessels also are expected to attain a speed of 33 knots. All four ships will be superior to anything we have got or are likely to have in the near future. Our swiftest carrier is the *Furious*, now undergoing alterations at a cost of about £300,000. She can steam at 31 knots, but her normal displacement is only 19,100 tons. The converted battleship *Eagle* is a 24-knotter, of 22,790 tons, which seems to have proved a very qualified success in her new character, judging by the time she has spent in dockyard hands since her first commission. The *Hermes* and the *Argus* are both excellent ships in their way, but, of course, cannot be compared with the new foreign carriers either as to speed or capacity for transporting aeroplanes. The truth is, however, that we have far more aircraft carriers than aircraft to put into them, and before any more money is spent on improving the carrier fleet it would be well to make sure that a sufficient complement of planes will be available for these ships if ever they are called upon for active service.—*Naval and Military Record*, 19 July, 1922.

Reconstruction of H.M.S. *Furious*

Hitherto the chief drawback to the use of planes as torpedo-carriers has been the tendency of the torpedo, when dropped into the water, to

break up or suffer machinery derangement that causes it to sink or run erratically. It is understood, however, that this defect has been largely overcome by evolving a special type of torpedo for the work in question, and there are rumors that a practical display of the powers of the new arm will take place during the King's visit to the Atlantic fleet this week. Another proof of the admiralty's continued interest in the naval side of aviation is the extensive overhaul which the *Furious* is now undergoing at Plymouth the cost of which will be upwards of £300,000. While the details of her reconstruction must be regarded as confidential for the time being, they are known to be of such a nature as will materially increase the value of the ship as a floating aerodrome, capable of taking to sea at high speed a large number of aeroplanes, including torpedo carriers, and affording them ample deck space both for flying-off and landing.

In her new guise the *Furious*, it is anticipated, will be the finest aircraft-carrier in the British navy, and will only be surpassed for speed and capacity by the huge battle cruisers which the United States and Japan are now converting on the same lines. Had the financial situation permitted, the admiralty would no doubt have preferred to build one or more absolutely new ships as tenders to air craft, since naval opinion is opposed to reconstruction on principle, and earlier attempts to adapt existing ships as aircraft carriers have not always been successful. In the prevailing circumstances, however, it would be impossible to obtain the funds necessary for laying down new large carriers of special design, so that the decision to spend £300,000 on modernizing the *Furious* is probably justified.—*Naval and Military Record*, 5 July, 1922.

New Capital Ships

Lord Lee of Fareham, first lord of the admiralty, made an important statement in the House of Lord's yesterday week, in the course of which he explained the government's attitude with regard to the two new capital ships, the construction of which is authorized under the Washington Treaty.

Replying to the Marquis of Linlithgow, the first lord remarked that he had been aware of the rumors in the press that the government either had or was about to execute a volte-face with regard to the building of the two capital ships sanctioned by the Washington Naval Treaty. The government had not reconsidered its decision, nor did it intend to do so. He preferred on the whole not to go in any detail into the technical question of what aircraft were or were not capable of in attack upon service vessels. He did not want to say anything which would in any way suggest—because it would be false—lack of sympathy on the part of the admiralty to the air force or to its continued development. There was no portion of the fighting services which was more interested in the development of aircraft than the Royal navy. It was a vital weapon of the fleet, and must be developed and made use of to the utmost possible extent. There had been no new developments in connection with either aerial or under-water attack which necessitated any reversal of the decision to proceed with the capital ships, or any modification in the constructional designs already approved. The admiralty believed it was feasible to build capital ships which should be reasonably proof against any known or, so far as one could forsee, any likely methods of attack. Designs for that purpose had already been worked out, and were ready for the builders' use.

The present relative position was that the United States had three post-Jutland capital ships completed, Japan had two actually completed, and Great Britain had only one hybrid battle cruiser. It was partly constructed before Jutland, and only partially embodied the lessons of

that battle. Other countries had none. Unless these two new capital ships, which had already been approved by parliament, were proceeded with, we should have to abandon the one-power standard, and should have to fall to third place in the most essential fighting spearhead of the fleet, which, of course, would be fatal to our prestige throughout the world, and a position which the board of admiralty could not possibly accept. He expressed surprise that the campaign against capital ships should be pursued in any responsible or instructed quarter, seeing that the whole question had been gone into thoroughly and exhaustively last year by a special committee of the Committee of Imperial Defence, presided over by Mr. Bonar Law. That committee reported that they had heard no evidence adequate to support the contention that the capital ship was obsolete, and that in naval warfare of the future the view must be accepted that these ships would play the same vital part they had done in the past. That finding coincided with the findings in other countries.

Sir Percy Scott, who was now leading the agitation against these ships, refused to attend the sittings and declined to give the committee any assistance whatever. This, coupled with the fact that he had not had the advantage of serving in a capital ship for more than thirty years, somewhat diminished the force and responsibility of his utterances. On the whole, he preferred to lean on the advice of the great sailors, headed by Lord Beatty, who actually commanded the fleets throughout the late war, and who were unanimous in the advice which they gave to the admiralty and the government that capital ships would continue to be an absolute essential and vital factor in the future.

The matter then dropped.—*Naval and Military Record*, 19 July, 1922.

PURPOSE OF BRITAIN'S TOWERS IS DISCLOSED.—London, July 12.—Mystery surrounding the huge concrete towers built by the admiralty just before the armistice was cleared up when Lieutenant-Commander Kenworthy, during debate at the Commons, explained that they were new anti-submarine weapons.

Toward the end of the war the admiralty completed two tremendous concrete structures, much like disproportionate pill boxes, weighing thousands of tons, at Channel ports. Ten other towers were under construction when the armistice was signed. Work was slowed on them, but finishing touches were put upon the completed towers.

During the submarine campaign it was vitally necessary to keep open the Straits of Dover, the main channel for troops and munitions from England to France. The admiralty invented the towers to combat the submarines. They were to be towed to sandbanks along the straits and sunk. They would have been occupied by the anti-submarine crews, where, reinforced by steel, they would have become island forts.

The towers, the admiralty thought, would provide much more efficient weapons than patrol boats, which were forced to seek shelter during rough weather. On the towers would have been mounted searchlights and guns which would have swept the channel for miles around.

In addition, there would have been apparatus for the detection of submerged submarines by sound, and there would have been "keys" for exploding minefields through which the passage of submarines was suspected or established.—*Baltimore Evening Sun*, 13 July, 1922.

Admiralty (Naval Staff)*

GENERAL DISTRIBUTION OF NAVAL STAFF DUTIES

FIRST SEA LORD AND CHIEF OF NAVAL STAFF

All large questions of naval policy and maritime warfare. Organization, distribution, and fighting and sea-going efficiency of the fleet.

Advice as to, and general direction of, operations of war.

Internal organization and general direction of the work of the naval staff, and the co-operation of the naval staff with the material side of the admiralty.

(To be kept informed of all important matters by the D. C. N. S. and A. C. N. S.)

DEPUTY CHIEF OF NAVAL STAFF (D. C. N. S.)

Naval Intelligence—its collection and utilization for naval operations; and superintendence of naval intelligence division.

Principles of training of the navy in combatant and staff duties, and superintendence of training and staff duties division.

All operations and movements of H. M. ships and co-operating aircraft, including auxiliary craft.

Consideration of strategic policy, and plans relating to such operations.

Distribution of the fleet as affecting operations and movements.

Dates of refits and repairs (in conjunction with controller).

Strategic aspect of land and wireless telegraphy.

Policy in relation to sea-borne trade and maritime transport.

Maritime international law.

ASSISTANT CHIEF OF NAVAL STAFF (A. C. N. S.)

Methods of fighting at sea generally. Tactical investigation.

Requirements of design of vessels and material in relation to policy and tactics.

Signalling in connection with tactics and weapons.

Fleet practices, co-ordination and standardization of methods.

Staff questions dealing with research and experiment.

Air development in relation to naval warfare.

DIVISIONS WORKING UNDER THE DEPUTY CHIEF OF NAVAL STAFF

1. *Naval Intelligence Division*

Collection of naval intelligence.

Distribution of intelligence to the fleet and to all naval establishments.

Information as to the movements of British and foreign ships (movements section).

Supervision of naval attaches.

Censorship, aliens, passports, safe conducts, suspected persons, prisoners of war.

Regulation of confidential books.

*NOTE

H.M. STATIONERY OFFICE,
PRINCES STREET,
WESTMINSTER, S.W.1.

C.5.16.1a. 29 May, 1922.

Sir,

I am directed by the Controller to acknowledge the receipt of your letter of the 9th instant and to acquaint you that no objection will be taken to your reproducing, in the U. S. NAVAL INSTITUTE PROCEEDINGS, the Report on the Distribution of duties of the Naval Staff (Cmd. 1343), provided that the source from which the reproduction is taken be duly acknowledged, and that mention be made of the fact that the permission of the Controller of His Majesty's Stationery Office has been obtained.

I am, Sir,
Your Obedient Servant,
L. G. Scorgie,
Deputy Controller.

The Secretary and Treasurer,
U. S. Naval Institute,
Annapolis,
MD.

2. Training and Staff Duties Division

Organization of staffs ashore and afloat.
Co-ordination between the naval staff and other admiralty departments.
Recommendations of officers for appointment to staffs.
Staff course and senior officers' courses.
Principles governing entry and training of officers and men.
Co-ordination of training.
Compilation of manuals dealing with strategical principles or staff training.
Co-ordination of all training manuals.
Preparation of historical monographs.

3. Plans Division

Methods of naval warfare in general in so far as they affect policy and strategy.
General plans for future wars.
Types and numbers of ships, quantity and distribution of material affecting the above.
Plans for fleet maneuvers.
Strategical co-operation with the army and air force.
Plans division will be kept entirely free from all executive work and routine work.

4. Operations Division

Operations, movements, and distribution of the fleet; preparation of orders dealing therewith, and issue of such orders, other than those despatched by letter.
Preparation of detailed plans for operations.
Letters of proceedings from commanders-in-chief, and of H. M. ships.
Advice on all questions which affect operations, movements and distribution of the fleet.
Keep movements section informed of distribution and movements of British forces, other than those dealt with by local defence division.

5. Local Defence Division

Defence of harbors and bases.
Patrol and minesweeping forces.
Fishing fleets.
Liaison with war office, air ministry, and other government departments on defence matters. Director of L. D. D. is a member of the home ports defence committee and overseas defence committee.
Defence schemes. Instructions for entry into defended ports.
Mine warnings.
Keep movements section informed of distribution and movements of local defence forces.

6. Trade Division

Trade division is the connecting link with the mercantile marine and the economic departments of the government.
Defence of British trade, which includes:
- Convoy, diversion of shipping, routing and war instructions to mercantile marine.
- Information in regard to British shipping.
- Defensive equipment of British merchant vessels and provision and training of personnel therefor.

Attack on trade, which includes:
- Blockade, contraband, and control of trade, enemy and neutral.

Questions of foreign policy, international law, and treaties, so far as they relate to above.
Prizes and prize court matters.

DIVISIONS WORKING UNDER THE ASSISTANT CHIEF OF NAVAL STAFF

7. Gunnery Division

Gunnery and chemical warfare policy.
Co-ordination and standardization in the methods of using weapons connected with the above, and training in such weapons.
Advice on material in connection with above so far as tactical requirements and policy are concerned.
Scrutiny of reports of gunnery practices, and advice on co-ordination of such practices.
Air co-operation in gunnery matters.
Recommendations regarding type and allocation of targets.

8. Torpedo Division

Torpedo, mining, anti-mining, and anti-submarine policy.
Co-ordination and standardization in the methods of using weapons connected with the above, and training in such weapons.
Advice on material in connection with the above so far as tactical requirements and policy are concerned.
Scrutiny of reports of torpedo, mining and anti-mining practices, and advice on co-ordination of such practices.
Air co-operation in torpedo, mining, anti-mining, and anti-submarine matters.
Advice on the tactical requirements of coastal motor boats, distant control boats, and torpedo planes.

9. Tactical Section

Assists A. C. N. S. with tactical problems and signalling in connection therewith, and with fighting instructions. Compilation of tactical manuals.

10. Air Section

Assists A. C. N. S. with air questions relating to naval warfare.
Co-ordination of all air matters dealt with by the naval staff.
Provides information on air matters required by any branch of the naval staff.

APPENDIX

DETAILED INSTRUCTIONS FOR NAVAL STAFF DIVISIONS

The Operations Committee consists of the following members of the board:

The first lord (*ex-officio* chairman).
The first sea lord and chief of naval staff.
The deputy chief of naval staff.
The assistant chief of naval staff.

It deals with questions of naval strategy and subjects connected with the provision, training, equipment, efficiency, organization, and utilization of the navy as a fighting force, and meets periodically as necessary.

2. The naval staff working under the operations committee is organized as shown in the diagram on page 8 (see page 1563), and consists of the following divisions:

Naval intelligence division.
Plans division.
Training and staff duties division.
Trade division.
Operations division.

Local defense division.
Gunnery division.
Torpedo division.

The superintending lords (D. C. N. S. and A. C. N. S.), to whom the superintendence of the several divisions of the staff is assigned, are primarily responsible for the efficient working of those divisions. This does not, however, preclude the C. N. S. from dealing direct with a division if necessary, nor the D. C. N. S. and A. C. N. S. from dealing direct with divisions not under their immediate superintendence. Divisions are enjoined to refer freely to other divisions, where the matter in hand requires such consultation.

Under the C. N. S., the D. C. N. S. is particularly concerned with strategy, policy, general principles of training and the conduct of operations, and superintends the six divisions standing first in the above list. The A. C. N. S. is particularly concerned with questions of tactics and fighting efficiency, the development of weapons and training in the use thereof, and all questions of naval co-operation with air forces; he superintends the gunnery and torpedo divisions, and is assisted by the tactical and air sections.

3. Staff meetings, attended by all directors of divisions under the presidency of one of the superintending lords, are held periodically. Directors of divisions may be accompanied by heads of sections of their divisions when necessary.

4. In order to avoid overlapping and duplication of work, each division must at all times communicate freely with all other divisions concerned with the matter in hand, care being taken that none interested is omitted. Close touch with plans division must be maintained by all other divisions so that action taken by them may be consonant with approved plans for possible hostilities or for future types of ships and material, and with naval intelligence division to ensure that they are in possession of the latest intelligence bearing on the matter in hand.

Inter-divisional minuting should always be avoided when verbal communication can replace it, joint minutes being prepared when matters concern more than one division. Separate minutes should be limited as far as possible to cases in which agreement cannot be reached, and it is then the duty of the division last dealing with a question to submit it for decision before it leaves the naval staff.

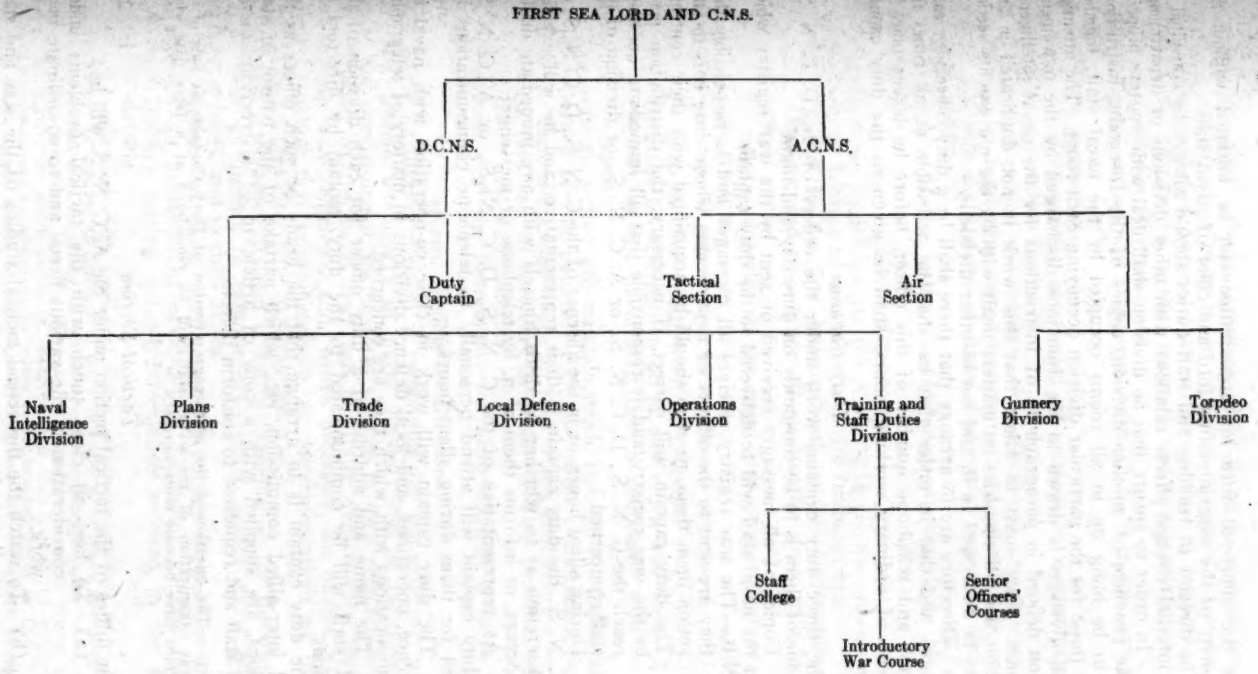
5. In the same way, close touch must be maintained by all divisions of the staff with the technical and supply departments that translate principles approved into action, in order that the policy recommended may be compatible with material development, and that the direction of development may be guided by the requirements of policy.

6. Directors of divisions are authorized to act without further approval of superintending lords in cases where the principle had already been approved, but it is their duty to keep the superintending lords informed as requisite of such action taken by them.

7. The deputy director of each division will perform such specific duties as are allotted to him by the director, but is to keep himself sufficiently conversant with the whole work of the division to replace the director in his absence. He should relieve the director of all matters of detail and routine as far as possible.

Where the expansion of the staff on the outbreak of war would involve the enlargement of one division into two separate divisions, the deputy director would, naturally, assume the position of director of one of them, and his duties should be arranged accordingly.

8. Instructions for each division follow, and the outline of the organization of each has been fixed. Subject to these, the internal organization of each division is the province of the director, but no large departures


FIRST SEA LORD AND C.N.S.
D.C.N.S.
A.C.N.S.
Duty Captain
Tactical Section
Air Section
Naval Intelligence Division
Plans Division
Trade Division
Local Defense Division
Operations Division
Training and Staff Duties Division
Gunnery Division
Torpedo Division
Staff College
Introductory War Course
Senior Officers' Courses

from the approved form of organization can be initiated without the authority of the superintending lord and chief of naval staff.

The director of training and staff duties should always be consulted if any internal change affects relations with other divisions or departments.

9. In order to ensure that no division shall deal with matters properly in the province of another division, copies of the foregoing instructions are to be hung up in all rooms occupied by the naval staff, together with those for the particular division occupying each room. The attention of all divisions is drawn to the functions discharged by the movements section defined in paragraph 13 of instructions for the naval intelligence division. Care must be taken that this work is not duplicated in any division, and all enquiries on matters dealt with by the movements section are to be addressed to it, and not to other divisions.

10. Directors are to arrange that there shall be a duty officer for each division, and that in order that he shall be accessible at all times the address and telephone number of this officer, before he leaves office at the end of ordinary working hours, shall be given to the duty captain daily.

Duty Captains

The three duty captains work under the orders of the D. C. N. S., and one of them is to be constantly on duty day and night.

2. Copies of all messages received or sent by the war registry which affect the naval staff will be delivered to the duty captain.

(N.B.—The war registry receives all messages and is responsible that they are sent to the officers or departments whose duty it is to take action upon them, or who should be acquainted with their contents. The duty captain will correct, if necessary, the distribution made by the war registry and is responsible that all immediate questions reach the C. N. S., D. C. N. S., or A. C. N. S., or division of the staff concerned.)

3. During silent hours, or in the absence of the C. N. S., D. C. N. S., or A. C. N. S., the duty captain is their representative, and he will exercise his discretion as to whether he deals himself with any immediate matter that occurs, or informs them of it, by telephone or messenger.

4. As representative of the C. N. S., D. C. N. S., or A. C. N. S., the duty captain will attend personally to telephone communications intended for them during silent hours.

5. The duty captain will work in close co-operation with naval intelligence, operations, and local defence divisions in matters of telegraphic communications with which they are concerned.

6. The name and address of a duty officer for each division of the naval staff will be communicated to the duty captain by directors of divisions.

The duty captain is to arrange that the heads of such offices as the naval inter-allied commission, etc., which partake of the nature of staff divisions, are supplied with a copy of article 10 of instructions to the naval staff and requested to conform thereto.

NOTE.—The question of the permanent retention of Duty Captains as part of the post-war organization of the naval staff will be considered at a later date when conditions have become more normal.

Tactical Section

The duties of the tactical section under the A. C. N. S. will be:

(a) To keep in close touch with the tactical problems under consideration in the various fleets, and to co-ordinate their work.

(b) To watch the theoretical tactical studies of the war and staff colleges.

(c) To advise as to information to be given to commanders-in-chief afloat upon those problems in regard to which the naval staff consider practical investigation is required.

(d) To compile the tactical manuals, and keep them up to date with the progress made.

2. The tactical section will also assist the A. C. N. S. in the consideration of:

Fighting instructions.

Tactics and maneuvers, as affected by weapons in use, and signalling in connection therewith.

3. The tactical section will maintain close touch with the gunnery and torpedo divisions respecting signal requirements of weapons in use or proposed, and with the director of signal department respecting technical signal questions.

4. Paragraph 3 of the instructions for plans division is to be conformed with.

Naval Air Section

1 The naval air section assists the A. C. N. S. in the consideration of all air questions relating to naval warfare. Its functions are:

(a) To deal in the first instance with all air information and reports, and co-ordinate all air matters dealt with by the naval staff.

(b) To advise generally on the naval side of questions of fleet air warfare.

NOTE.—Advice on the air side is the province of the air ministry.

(c) To keep in close touch with air progress.

(d) To assist by information or in any other way required any branch of the naval staff that is concerned with the air weapon.

2. The naval air section will maintain touch, through the liaison officer especially attached for the purpose to the air officer commanding coastal area, with the various branches of the air staff which deal with the air side of fleet air warfare, and, as necessary, with the technical branches of the air ministry which deal with material.

3. Paragraph 3 of the instructions for plans division is to be conformed with.

Naval Intelligence Division

The naval intelligence division is responsible for the collection of all home and foreign intelligence of naval interest; for its collation and record; and for issuing it, in the form suitable to their requirements, to other divisions of the naval staff and admiralty departments, together with remarks and criticisms, and, where necessary, an outline of the courses of action that arise therefrom, or recommendations as to the policy to be adopted (*see* note to paragraph 2).

The naval intelligence division is further responsible for the distribution of such intelligence to commanders-in-chief, senior naval officers afloat and at bases, and to ships at sea.

2. The director of naval intelligence will submit suggestions at his discretion on all questions of naval policy (including general foreign or imperial policy) arising out of information received in the naval intelligence division.

NOTE.—All papers on which courses of action or recommendations as to policy are made should be referred to director of plans in order to facilitate coordination of the policy suggested with the policy on which strategic requirements are based, or on which war plans are drawn up. In the case of telegrams or other urgent papers received in N.I.D., in which policy is involved, the D.N.I. may be required to submit recommendations or advice as to policy to be adopted direct to D.C.N.S. or C.N.S. In these cases, copies of such recommendations are always to be sent to director of plans for information.

3. The D. N. I. will keep in close touch with the D. O. D. with respect to projected movements of British forces which concern relations with foreign powers, and similarly, with respect to matters affecting relations with foreign powers that may have a reaction on projected movements of British forces.

4. He will supervise the organization of the naval intelligence system throughout the world, and is responsible for preparing and issuing instructions and publications dealing therewith.

5. He will supervise the work of naval attachés, corresponding direct with them, and dealing with their reports.

6. He is also authorized to communicate direct on naval intelligence matters with the following:

Home, foreign, war, air, colonial and India offices; Officers in charge of naval intelligence offices in U. K., naval intelligence officers and naval consuls abroad. Other local officials as necessary.

7. He will be responsible for all forms of special intelligence, and will prepare and keep up to date the organization necessary to ensure immediate operation on the outbreak of war, maintaining the necessary nucleus staff.

8. He will deal with or advise upon all questions of naval censorship, including those of such press articles and publications as are submitted for approval before publication, and those of admission of press correspondents to H. M. ships and naval establishments, and all matters affecting the press generally on naval subjects.

9. He will, as far as naval interests are concerned, deal with or advise upon the following matters, such as in time of war are covered by the Defence of the Realm act:

Aliens,
Passports,
Safe conducts,
Suspected Persons,
Prisoners of war.

10. He is responsible for the following duties in connection with confidential and other books for the naval service:

(a) Classification of printed books for the fleet, giving effect to the principle that the "C. B." series shall contain only secret and confidential matter.

(b) Advice to the compilers on the contents of authorized books in course of preparation, in order that confidential and non-confidential matter may be issued in separate publications, that overlapping may be prevented, and that the issue of confidential books may be reduced as far as possible.

(c) Recommendations for re-classification of any books as soon as the necessity for their secrecy ceases.

(d) Regulation of the establishment of confidential books for sea service, ships in reserve and naval establishments, as advised by the heads of branches producing books, with a view to limiting the issue to each class of ship to what is actually necessary at the time.

(e) Regulation of the distribution of books (except cyphers).

(f) In consultation with the division or department compiling each book, regulation of the number of copies to be printed, having regard to the period the book is likely to run before revision, its secrecy and stowage, and the cost of production.

11. To enable him to carry out the duties defined in 10 (*b*), (*c*), and (*f*), heads of divisions and departments, previous to the preparation of any new books or the revision of existing books, should instruct those

responsible for the production to confer with D. N. I. on the points mentioned; to keep him fully informed of the reasons for keeping the books confidential or secret; in order to prevent overlapping to supply him with a précis of the scope, nature, and details of the book in question; and to comply with the requirements stated in paragraph 10 (*b*) above.

When proposals for new books, or revisions of existing books, are put forward to the board, the papers initiating the proposals should be marked to D. N. I. for information before submission to the board.

12. He will supervise the staff library at the admiralty.

13. He will provide the officer in charge of, and will generally supervise, the movements section (I. D. 20). An officer from operations division and clerical staff belonging to intelligence division, operations division, and the military branch of the secretary's department work in this section, and in it are concentrated all records of movements or units dealt with by them.

The function of the movements section is to analyze, record, and promulgate as necessary inside the admiralty all information relating to movements of British and foreign war vessels (including British auxiliary patrol vessels and fleet auxiliaries), and to supply the G. P. O. with mail addresses of H. M. ships. Movements of war vessels are also recorded on wall charts.

NOTE.—Programs of movements etc., which are ordered to be notified to the whole office, are issued by the secretary (military branch) in the ordinary way.

Plans Division

1. The plans division will advise on all large questions of naval policy and maritime warfare.

2. Its functions will be the consideration of:

(*a*) Methods of naval warfare in general, in so far as they affect policy and strategy.

(*b*) The recommendation and revision of general plans for future wars as distinguished from detailed plans of operations which are a function of operations division.

(*c*) Questions of general imperial policy and of the policy of nations allied, or possibly allied, in relation to (*b*).

(*d*) General strategical questions, such as development of naval bases and communications, the attack and defence of commerce and the state and disposition of the fleet.

(*e*) Questions of strategical co-operation with the army and air force.

(*f*) Questions of international law in so far as it is concerned with imperial strategy and naval policy.

(*g*) Types and numbers of ships, submarines, aircraft, etc., and quantity and distribution of material, required by strategy or policy.

(*h*) Combined operations, in consultation with imperial general staff and air staff, their scale and general lines of organization. Types and numbers of ships, auxiliaries, and material connected therewith.

(*k*) Questions of fleet numbers in relation to admiralty policy.

(*l*) New scientific developments from strategical point of view.

(*m*) General plans for fleet maneuvers.

3. The director of plans or his representative will attend meetings held to discuss new designs of vessels or aircraft, or large alterations of existing designs, to advise on strategical requirements. Proposals for new types of ships or aircraft are to be referred to him for examination before detailed designs are prepared, or, in the case of "repeat" orders, before orders are placed.

4. Suggestions involving new operations or employment of new weapons, appliances, or material, shall be referred to director of plans for information and opinion on their strategical aspect.

5. The director of plans will keep the director of signal department sufficiently informed of the work of plans division to enable the latter to ensure that the signal organization keeps pace with strategical requirements.

6. Plans division will be kept entirely free from all executive or routine work.

Training and Staff Duties Division

The director of training and staff duties division will advise on the following matters:

(*a*) Organization of the admiralty naval staff and co-ordination of divisions of the staff.

(*b*) Co-ordination and relationship of the staff with other branches of the admiralty.

(*c*) Principles of staff organization and definition of duties of officers of staffs, ashore and afloat.

(*d*) Establishment of staffs.

(e) All questions of staff qualifications.

(*f*) Recommendations of officers to qualify for staff duties, and for appointments on the admiralty naval staff and corresponding appointments on the staffs of flag officers ashore and afloat.

(*g*) Principles governing systems of entry of officers and men.

(*h*) General principles governing general and technical education and training of officers and cadets, men and boys, and co-ordination of schemes of education and training with one another in accordance with those principles.

2. He will be responsible for schemes of training and instruction in the staff college and senior officers' courses and introductory war course, and will advise upon governing principles, subject matter to be included, and general methods of instruction to be adopted.

3. He will be responsible for:

(*a*) Preparation of all manuals and text books dealing with staff duties and staff training, and of historical monographs dealing with operations or required by the staff college.

(*b*) Compilation, in co-operation with the fleet and other divisions of the naval staff, of all manuals dealing with strategical principles.

(*c*) Consideration from a co-ordinating point of view and final submission for approval of all manuals dealing with general training, or training in special branches, prepared by other divisions of the naval staff or technical departments.

(*d*) Advice from a co-ordinating point of view on text books upon technical subjects, so far as these involve the treatment of strategical principles, and reference of such text books to tactical section if they touch upon tactical principles.

(*e*) Advice as to what books are to be included in officers' libraries.

4. Inasmuch as the activities of the D. T. S. D. will very generally concern the second sea lord as well as other members of the board, it is essential that the closest inter-communication should be maintained, and that they should be consulted on matters that concern them.

5. In the performance of his duties he will, when required by the C. N. S., visit commands, or make enquiry into any matters upon which information is needed.

Trade Division

The trade division is the connecting link between the admiralty and:

(a) The mercantile marine, in matters concerning defence of British seaborne trade and self-defence of shipping engaged therein.

(*b*) The political and economic departments of the government, in matters concerning offensive action against potential enemy trade; and maintenance of British seaborne trade, as far as the latter concerns the protection of British shipping.

2. For the purpose of (*a*), the director of trade division will keep in close touch with the board of trade (marine department), ministry of transport, customs, and other departments concerned: Lloyds, shipping associations, and kindred bodies.

For the purpose of (*b*), he will keep in close touch with the foreign office, board of trade, department of overseas trade and other departments concerned.

3. He will be responsible for the preparation, and revision as required, of plans for:

Convoys.
Diversion of shipping.
Routes for independent sailings.
War instructions for mercantile marine on these subjects.

He will keep in close touch with the directors of plans, operations, and local defence divisions, and the director of transports and shipping in this connection.

4. For the purpose of the above, he will collect and keep the necessary information and statistics relating to:

British shipping on various routes.
Facilities for fuelling and repairing ships.
Facilities for handling cargo (in case of diversion) throughout the world, obtaining intelligence on these matters from the authorities referred to in paragraph 2, and by means of a liaison section working with the naval intelligence division.

5. He will prepare and keep up to date plans for:
Arming and equipment of British merchant vessels in time of war.
Provision and training of personnel therefor.

War and technical instructions to mercantile marine on these subjects; keeping in close touch with the technical and supply departments with respects to provision of material; with gunnery and torpedo divisions with respect to technical progress; with admiral commanding reserves and second sea lord's department with respect to personnel; and with the director of transports and shipping regarding the selection of ships to be taken as convoy escort vessels.

He will advise on questions of claims from and allowances to shipowners on these matters.

6. He will advise upon the use of rescue tugs in war.

7. He will advise on all matters of blockade, contraband, and the control of trade, enemy and neutral, and on questions of foreign policy, international law and treaties as far as they relate to matters of blockade, contraband, and control of trade. For this purpose he will collect for all maritime countries information and statistics relating to oversea sources of supply of:

Staple food stuffs;
Raw materials essential to economic life:
Commodities likely to be of military value in war;

obtaining intelligence on these matters from the authorities referred to in paragraph 2 and by means of a liaison section working with the naval intelligence division.

8. He will keep in close touch with the director of plans division in all these matters.

The Operations Division

The operations division will deal with all matters relating to the operations, movements, and distribution of the fleet.

2. The director of operations division will arrange to keep, in the movements section (*vide* paragraph 13 of instructions for naval intelligence division), complete records of the distribution and movements of all British forces other than those dealt with by local defence division. He will keep the operations committee of the board fully informed of the current situation, and will prepare such summaries and appreciations as are required by them, drawing the necessary information from intelligence, trade, and other division when concerned.

3. He will assist as required in the preparation of orders dealing with operations, movements, and distribution of the fleet; and, in consultation with the director of signal department regarding methods and routes of messages, will issue to the fleet those despatched otherwise than by letter.

4. He is responsible for the preparation of sailing orders issued from the admiralty to H. M. ships, including those not in commission when moved by sea. He will, when requested by the various departments controlling the movements of fleet auxiliaries and vessels on government charter, co-operate with them in the preparation of sailing orders for such vessels.

5. He will prepare and keep up to date detailed plans of operations in accordance with the general policy laid down by C. N. S.

6. He will advise on the following matters from the point of view of their effect on operations, movements, and distribution of the fleet:

Commissioning, trials, and refits of H. M. ships.
Mining.
Fishing areas; restrictions, etc.
Navigation and pilotage.
Transport and trade.
Communication questions (*see* paragraph 12).
Supply of stores, ammunition, and fuel to the fleet, and instructions for taking up mercantile fleet auxiliaries.
International law, questions relating to hospital ships and cartel ships.

7. Letters of proceedings from commanders-in-chief and of H. M. ships will be referred to D. O. D., who will be responsible for initiating the necessary action upon them so far as they affect matters dealt with by the division.

8. The following are also to be referred to the D. O. D.:

Political questions (foreign or home) affecting the fleet.
Correspondence with other departments of state relating to such questions.
Reports of courts-martial, courts of enquiry, and other disciplinary reports which relate wholly or in part to operations and movements.

9. The D. O. D. will keep in close touch with the D. N. I. with respect to movements of British forces that concern relations with foreign powers, and will co-operate with him in the working of the movements section, as laid down in paragraph 13 of instructions for intelligence division.

10. He will keep in close touch with hydrographer with respect to maintenance of charts and other hydrographic publications required for the use of the naval staff (staff information chart room).

11. He will be responsible for the preparation and revision of publications and returns falling within his province.

12. He will keep the director of signal department sufficiently informed on current operations to enable the latter to ensure that the signal organization keeps pace with operational requirements.

Local Defence Division

1. The director of local defence division will advise as to the organization and employment of patrol and minesweeping forces throughout the world; as to the passive defence of harbors and bases; and on defence matters generally.

2. In accordance with the general policy approved by C. N. S. he will prepare detailed plans:

(*a*) For the organization and employment of patrol and minesweeping forces,* control and grouping of fishing fleets; and

(*b*) Relating to passive defence of harbors and bases against attack by sea, and, so far as navy is concerned, by air or land.

He will keep them up to date in accordance with the current state of resources and progress, technical and personal.

He will keep in close touch with plans division in this connection.

* NOTE.—These comprise the following craft, except when attached to sea-going forces: all minesweeping and boom defence craft; that employed on purely anti-submarine duties, *i. e.*, hunting flotillas; those attached to auxiliary patrol squadron, including fishery protection craft; those attached to bases for local defence duties; and those detailed for mine-laying in defence of harbors.

3. He will advise as to bringing these plans into force, and as to allocation distribution, and employment of forces involved. He will assist as required in the preparation of orders dealing with those matters and, in consultation with the director of signal department regarding methods and routes of signals, will issue those despatched otherwise than by letter.

4. He will supply the movements section (*vide* paragraph 13 of instructions for naval intelligence division) with the information in his possession respecting movements of the vessels detailed in note to paragraph 2, necessary for the records kept by that section.

5. He will keep in close touch with the operations division with respect to plans for fleet sweeping.

6. He will keep in close touch with the naval air headquarters so as to ensure co-ordination of air patrols with naval patrols, anti-submarine and minesweeping forces.

7. He will keep in close touch with the trade division, in order to co-ordinate plans for minesweeping on outbreak of war with those for control of mercantile movements.

8. As a member of the home ports defence committee and overseas defence committee he will keep in touch, as regards defence matters, with the war office, air ministry, colonial and India offices, and other government departments.

9. He will maintain close touch with the torpedo division and gunnery division in order to co-ordinate plans for the employment of the forces referred to in paragraph 2 with technical progress and requirements of training, and to obtain any technical assistance required in connection with defence schemes.

10. He is responsible for revision of defence schemes, defence charts, instructions for entry into defended ports, and other similar books of instructions concerning defence matters.

11. He is responsible for the organization for the issue of mine warnings in conjunction with the director of signal department, and he will keep the latter sufficiently informed on the work of the local defence division to enable him to ensure that the signal organization keeps pace with operational requirements.

Gunnery Division

1. The director of the gunnery division (D. of G. D.) will advise on:

(*a*) Practical gunnery and gunnery exercises.
(*b*) The use of gas and smoke in warfare and counter-measures.
(*c*) The methods of instruction in the training establishments for carrying out training in the use of:
(*i*) Gunnery weapons,
(*ii*) Smoke, gas, anti-gas apparatus.

He is responsible for keeping the naval staff in touch with progress and general development of the fleet in gunnery and chemial warfare and with the method of conducting gunnery and chemical warfare practices at sea.

2. He will advise on:

(*a*) Gunnery policy, both offensive and defensive as affecting design.
(*b*) Quantity and distribution of gunnery material so far as tactical requirements are concerned.
(*c*) Effect on gunnery policy of technical development and scientific research and progress.
(*d*) Air co-operation in gunnery matters.

NOTE.—Technical advice on the design of gunnery material, chemical warfare material, and material for counter-measures is the function of the director of naval ordnance.

3. He is responsible for scrutinizing all reports of gunnery practices submitted to the admiralty for review by commanders-in-chief and senior officers, and will advise as to the action necessary:

(*a*) To control the lines on which the various commands are working, and to co-ordinate their work.
(*b*) To keep each command in touch with the progress made by others.
(*c*) To standardize methods.

4. In matters of material arising from reports of practices, he is responsible for co-ordinating suggestions from various commands and for advising on them from the point of view of practical use and training, before they are dealt with by the appropriate department under the controller.

5. He is responsible for the compilation of records and summaries of fleet gunnery practices, and for the preparation and periodical revision of the firing manual and any other handbook relating to his duties. He is responsible that these embody all general orders for carrying out practices necessary for the acquisition and maintenance of efficiency, and all lessons learned from action experience and peace practices.

NOTE.—The responsibility for progress and development in gunnery matters in the fleets under their command rests entirely with the various commanders-in-chief.

6. In conjunction with the director of training and staff duties, who is responsible for advice on general policy and principles of training, he is responsible to the A. C. N. S. for the formulation of requirements of technical gunnery training.

7. He is responsible to the A. C. N. S. for advice on training in the use of gunnery weapons, smoke, gas and counter-measures carried out at the training establishments.

8. With regard to paragraph 6 and 7, he will keep in close touch with the director of naval ordnance, who is responsible to the second sea lord for advice on complements and quarter bills, training in so far as it affects safe working and maintenance of material, and training in diving, and who is responsible to the controller for advice on material.

NOTE.—The D. of G.D. is concerned with the use of weapons whilst the D.N.O. is concerned with their preparation for use. These respective spheres of activity meet in the drill which is required to prepare finally the weapon for use. Drill, having the double purpose of producing the best result from the weapon and also of preventing damage or accident due to improper handling of material, is common ground to both the D. of G.D. and D.N.O., to whom it is a joint responsibility. Whilst therefore close co-operation between the D. of G.D. and D.N.O. is always necessary, it is especially so in the domain of drill.

9. He will be responsible for recommending the type and the allocation of targets to meet the requirements of the fleet.

NOTE.—Designs, repairs, and provision of targets are administered by the controller's department.

10. He will at all times maintain close touch with the director of torpedo division respecting suggestions for the employment of new weapons, and with director of plans respecting the strategical aspect of all questions referred to him.

11. He will be at liberty to communicate directly with the commanding officers of the gunnery schools on all questions of training in the use of weapons lying in his sphere as defined by these instructions.

12. He will conform with paragraph 3 of the instructions for plans division.

Torpedo Division

1. The director of torpedo division (D. of T. D.) will advise on:
   (*a*) The practical use of and exercise with torpedoes, mines, anti-mine devices, anti-submarine weapons and methods.
   (*b*) The methods of instruction in the torpedo, mining, and anti-submarine schools for carrying out training in the use of weapons.
   (*c*) The tactical requirements of coastal motor boats, distant control boats and torpedo planes.

He is responsible for keeping the naval staff in touch with the progress and general development of the fleet in the use of these weapons, and with the methods of conducting exercises therein at sea.

2. He will advise on:
   (*a*) Torpedo, mining, anti-mining, and anti-submarine policy, both offensive and defensive as affecting design.
   (*b*) Quantity and distribution of material concerned in the above so far as tactical requirements are concerned.
   (*c*) Effect on that policy of technical development and scientific research and progress.
   (*d*) Air co-operation in torpedo, mining, anti-mining and anti-submarine matters.

NOTE.—Technical advice on torpedo, mining and anti-submarine material matters is the function of the director of torpedoes and mining.

3. He is responsible for scrutinizing all reports of torpedo, mining, and anti-submarine practices submitted to the admiralty for review by commanders-in-chief and senior officers and will advise as to the action necessary:

(*a*) To control the lines on which the various commands are working, and to co-ordinate their work.
(*b*) To keep each command in touch with the progress made by others.
(*c*) To standardize methods.

4. In matters of material arising from reports of practices he is responsible for co-ordinating suggestions from various commands, and for advising on them from the point of view of practical use and training, before they are dealt with by the appropriate department under the controller.

5. He is responsible for the compilation of records and summaries of fleet torpedo, mining and anti-submarine practices, for the preparation and periodical revision of *Regulations for Practice Running* and any other handbook relating to his duties. He is responsible that these embody all general orders for carrying out practices necessary for the acquisition and maintenance of efficiency, and all lessons learned from action experience and peace practices.

NOTE.—The responsibility for progress and development in torpedo, mining, and anti-submarine matters in the fleets under their command, rests entirely with the various commanders-in-chief.

6. In conjunction with director of training and staff duties, who is responsible for advice on general policy and principles of training, he is responsible to the A. C. N. S. for the formulation of requirements of technical torpedo, mining, and anti-submarine training.

7. He is responsible to the A. C. N. S. for advising on the training of officers and men in the use of torpedo, mining, anti-mining and anti-submarine weapons in accordance with the instructions laid down in the training manuals and the requirements of the sea-going fleets.

8. With regard to paragraphs 6 and 7, he will keep in close touch with the director of torpedoes and mining and the director of signal division who are responsible to the second sea lord and controller for advice as to requirements in personnel and material, and for advice on that part of training which affects the safe working and maintenance of material.

9. He will at all times maintain close touch with the director of gunnery division respecting suggestions for the employment of new weapons, and with director of plans, respecting the strategical aspect of all questions referred to him.

10. He will be in direct communication with the commanding officers of the torpedo, mining, and anti-submarine schools on all questions of training in the use of weapons.

11. He will conform with paragraph 3 of the instructions for plans division.

JAPAN

LAST YEAR'S FLEET MANEUVERS: (By Hector C. Bywater.)—An interesting account of the Japanese naval maneuvers that took place in October last has been sent home by the Spanish naval attaché at Tokyo, and is now reproduced in a Spanish periodical. It appears from this narrative that nearly the whole of the effective fleet was mobilized for the occasion. The general scheme was that a hostile fleet (Blue) had arrived off the coast with the intention of penetrating to the Sea of Japan and seizing islands, and possibly harbors, on the littoral of Japan proper, for use as bases of operation. This fleet comprised the largest and most powerful ships, while the defending force (Red) was largely made up of less modern vessels. The capital ships controlled by "Blue" were the *Nagato, Fuso, Ise, Yamashiro, Kongo, Kirishima, and Hiyei.* Attached ships included five light cruisers, a large number of destroyers and two flotillas of sub-

marines. The defending fleet was also well supplied with destroyers and underwater craft, and both sides had merchant auxiliaries for use as troop transports and supply ships, besides aircraft working from shore aerodromes and floating carriers. After concentrating in the gulf of Hakata, off the coast of Kyushiu, "Blue" fleet, on October 21-23, broke into the Sea of Japan through the Tsushima Strait, and took possession of the island of Oki as a point *d'appui*, which was hastily fortified by a landing party of marines under Rear-Admiral Ishuin.

On the night of October 24 a number of "Blue" transports, under strong guard, eluded the vigilance of the Third "Red" Squadron (*Aki, Satsuma, Kashima, Katori*, etc.), and threw ashore a strong marine detachment in the gulf of Mionoseki, with the object of capturing the naval base of Maidzuru. The following day contact was made between "Blue's" main body, commanded by Admiral Tochinai, and the third squadron of "Red" fleet, and a heavy engagement was fought, both sides making free use of their aircraft. On the twenty-seventh the main body of the "Red" fleet came up, and a general fleet action developed, in the course of which the artillery duel was conducted on the most up-to-date principles of fire control, and there were repeated attacks by destroyers, and submarines. Eventually this combat was ordered to cease by Admiral Yamagata, chief of naval staff, who acted as senior umpire for the maneuvers, with his flag in the transport *Manshu*. A great many other distinguished officers, including the late Admiral Prince Higashi Fushimi, followed the operations from the battleship *Settsu*. In all there were 130 vessels of various types included in the two fleets. With the exception of a collision in which the destroyers *Hamakaze* and *Okikaze* were damaged, there were no accidents, mishaps, or breakdowns of any kind, a result that spoke well for the training of personnel and the efficiency of the material. —*Naval and Military Record*, 5 July, 1922.

AIRSHIP EXPLODES.—Tokio, July 10.—The naval airship which arrived here from England in April last exploded this morning. It is a complete wreck.

The hangar in which it was housed at Yokosuka was also destroyed. There were no casualties.—*Reuter.*

JAPAN'S NEW NAVAL PROGRAM, By Hector C. Bywater, *Special Correspondent of The Sun.*

The following table, which shows the light cruiser strength of the two navies when the new Japanese program is completed, gives food for thought:

Japan

3 Ships	(*Yahagi, Chikuma, Hirado*),	5,000 tons, 26 knots, 8 6-inch guns.
2 Ships	(*Tatsuta, Tenryu*),	3,550 tons, 32 knots, 4 5.5-inch guns.
10 Ships	(*Kuma, Tama, Kitakami, Oh-i, Kiso, Nagara, Isudzu, Natroi, Kinu, Yura*),	5,600 tons, 32 knots, 7 5.5-inch guns.
6 Ships	(*Abukuma, Kaka, Naka, Sendai, Jintsu, Ayase*),	6,500 tons, 32 knots, 8 6-inch guns.
4 Ships	(*Otonase, Minase, "C"* and *"D"*),	7,000 tons, 32 knots, 8 6-inch guns.
4 Ships	(*"E," "F," "G"* and *"H"*),	10,000 tons, 32 knots, —— 8-inch guns.

29 Ships with aggregate displacement of 185,100 tons.

United States

10 Ships	(*Omaha, Milwaukee, Cincinnati, Richmond, Concord, Raleigh, Detroit, Trenton, Marblehead, Memphis*),	7,500 tons, 33¼ knots, 12 6-inch guns.

10 Ships with aggregate displacement of 75,000 tons.

London, July 6.

In their report to President Harding on the result of the Washington Conference, the American delegates affirmed that the limitation treaty "absolutely stops the competitive race in naval armaments. At the same time it leaves the relative security of the great naval powers unimpaired, No national interest has been sacrificed; a wasteful production of unnecessary armament has been ended."

This claim would be strictly true were dreadnaughts the only instrument of naval warfare, for competitive building of dreadnaught tonnage certainly has come to a dead stop. But the dreadnaught, though still the embodiment of tremendous offensive power, is no longer universally acknowledged as the most potent weapon of sea combat. Its supremacy is menaced by smaller and cheaper weapons, the development of which goes on unceasingly, while the dreadnaught itself has already reached the practicable or rational limit of evolution. Even the most stalwart champions of the great ship are not prepared to give it more than a few more years of primacy, realizing as they do the incalculable possibilities which lie in the airplane as a carrier of giant bombs and torpedoes.

Those who framed the original scheme of naval reduction were evidently cognizant of this depreciation of the great ship, for they were at pains to fix the ratios of auxiliary tonnage no less definitely than for dreadnaughts. But unfortunately the submarine dispute knocked this part of the scheme on the head, while it was also decided not to interfere with aerial armaments, on the ground that any restrictions in this connection would hamper the development of commercial aircraft and thus slow down progress which promised to be of benefit to civilization.

All the powers that signed the treaty were consequently left free to build auxiliary ships of war, subject to certain limits of displacement and battery in the case of cruisers, though strong hopes were entertained at the time that no signatory would take advantage of the loophole thus presented to augument its naval forces contrary to the spirit, if not the letter, of the treaty.

Barely two months after the treaty had been signed I was able to announce in *The Sun*, on the basis of reliable news which had reached me from Tokio, that the Japanese naval authorities were revising their shipbuilding plans with the object of making good the deficiency caused by the scrapping of so many new battleships, and had decided not only to accelerate the construction of such cruisers, destroyers and submarines as had been authorized under the "eight-eight" program of 1920, but also in every case to redesign those vessels with larger dimensions and greater fighting power. On the strength of this exclusive report to *The Sun*, other American papers charged Japan with the intention of evading her treaty obligations, though so far, at any rate, there is no evidence to support that accusation.

Meanwhile my message with regard to the increased tonnage and armament of new Japanese auxiliary craft has been confirmed by an official communique issued at Tokio by the imperial navy department on July 3. This is the first time that advance particulars of new Japanese warships have ever been published on official authority, and the fact that such a radical departure from tradition has been made is proof of Japan's desire to vindicate her *bona fides* before the world.

What she intends to do in the way of reinforcing her fighting fleet is to be done openly and without concealment. According to the communique, she has adopted an auxiliary building scheme which provides for the construction of four cruisers each displacing 10,000 tons, four cruisers of 7,000 tons each, 24 first-class torpedoboat destroyers with an aggregate tonnage of 33,000, and 24 submarines totaling 28,166 tons. This, it is claimed, represents a reduction of 13,935 tons—equivalent to one

cruiser, 13 destroyers and 24 submarines—as compared with the original program of ships to be completed by 1927, which would, however, have had a much smaller average of displacement than those now to be built. Nor is it made at all clear that the 56 new vessels represent the maximum amount of construction upon which Japan will embark between now and 1927.

To appreciate the significance of this new program it is necessary to remember that a considerable amount of naval shipbuilding is already in progress in Japan. Well-informed circles estimate the scope of this work as follows: Three aircraft carriers, including two of 26,000 tons each and one of 9,600 tons; 10 or 11 light cruisers, from 5,600 to 7,000 tons; two gunboats; 12 to 15 destroyers, and at least 25 submarines. If this computation is correct, and it is founded on exceptionally reliable data, it means that when the new auxiliary program has been put into effect Japanese naval construction will embrace the following ships: 18 or 19 light cruisers, 36 or 39 destroyers and 49 submarines, besides the airplane carriers and gunboats mentioned above. Moreover, the new vessels, with few exceptions, will be larger and more powerful in every way than the corresponding types in other navies.

Future defense requirements and the necessity of keeping alive the shipbuilding industry are the motives officially assigned for the latest program. Labor troubles which might lead to social disorder of the gravest description would, so the Japanese government declares, inevitably ensue were all naval construction to be stopped and the 60,000 workers employed thereon given their discharge. There is, no doubt, much truth in this argument; but all the same, to go on building expensive ships of war and ordering many new ones seems a curious method of placating labor. Before the Washington Conference there was a great deal of popular discontent in Japan at the inflated expenditure on naval armaments and the resulting heavy taxation. By scrapping the battleships a saving of hundreds of millions of dollars has been effected, but if so many cruisers and lesser craft are to be built the net saving will be considerably smaller than was anticipated.

As for the plea that the new vessels are needed to replace the canceled battleships in the scheme of national defense, the design of the former is more suggestive of attack than of defense. Cruisers of 10,000 and 7,000 tons would be unnecessarily large and costly for the work of guarding Japan's communications with the Asiatic mainland or protecting her home coasts, and the same true of the big submarines she proposes to lay down. Both types would, however, be very useful for preying upon enemy merchant ships and carrying the war into hostile waters.

The four 10,000-ton cruisers represent the extreme limit of size for these vessels permitted by the treaty. They will have a speed of not less than 31 knots, a battery of 7½-inch or 8-inch guns and a steaming endurance of 12,000 sea miles, or sufficient to cross and recross the Pacific Ocean with a good margin to spare. There are no cruisers of equivalent power at present in the British or the United States navy, though the four British ships of the *Raleigh* type—the nameship of which recently visited Washington—are almost as large and as fast.

If war broke out in the Pacific and these four swift, heavily armed Japanese cruisers were dispatched to harass American shipbuilding, there would be nothing to touch them in the United States navy as it is constituted at present. They would be too fast to be caught by the old armored cruisers and too powerful to be engaged with any prospect of success by scouts of the *Omaha* class. It is not too much to say that the presence of these four ships alone on the trade highways of the Pacific would be enough to paralyze American shipping in that ocean. The four 7,000-ton cruisers will be less formidable, though they also would repre-

sent a serious menace to the ocean-borne trade of a state with whom Japan was at war. In speed, battery and steaming radius they will probably be equal to the *Omaha* class.

The 24 new Japanese destroyers, with a total displacement of 33,000 tons, will average 1,375 tons each, or about 150 tons more than the largest American destroyers built up to now. On the other hand, the United States navy will still maintain the lead in destroyer strength, thanks to the huge wartime program of these craft.

Twenty-four submarines with an aggregate of 28,166 tons are included in the Japanese project, and if built to uniform design would average about 1,173 tons each. Most probably, however, they will be divided into two groups, one of medium-size ocean-going submarines and the other of large cruiser-submersibles. According to the tonnage aggregate given, it would be possible to build 12 boats of 800 tons and 12 of 1,550 tons; or, alternatively 16 of 800 tons and 8 of 1,920 tons.

All that is known for certain is that Japanese naval constructors have prepared plans for submarine cruisers as large as any that the Germans put afloat during the World War, and that special importance has been attached to wide cruising radius in the case of all Japanese submarines of recent design. There is sound authority for the statement that half the Japanese underwater craft which are now building or projected would be capable of voyaging to the American coast and back with a few thousand miles to spare.

In political and naval circles here there is some speculation as to the effect which this revival of Japanese shipbuilding activity may produce on the naval policy of the United States. Few believe the American naval authorities will rest satisfied with a cruiser establishment so much inferior to Japan's especially in view of the phenomenal growth of the American merchant marine and the necessity of taking adequate measures for its protection in the event of war.

While due allowance is made for the legitimate desire of Japan to safeguard her coasts and conserve her shipbuilding industry, it is felt here that she has acted unwisely in bringing forward a new program of such imposing dimensions so soon after the conference, and at a time when nearly every other power bound by the treaty is cutting down its naval expenditure with a ruthless hand.—*The Baltimore Sun*, 21 July, 1922.

A SUMMARIZED STATEMENT OF THE RETRACTIONS AND EXPANSIONS WHICH HAVE OCCURRED IN THE JAPANESE PROGRAM OF ARMED PREPAREDNESS, By Hector C. Bywater, *Special Correspondent of The Sun.*

London, July 14.

Now that the leading features of Japan's future naval program are known, the moment seems opportune to review the general effect which has been produced on the armament policy of the Island Empire by the Washington Conference. Taking naval preparations first, we find them to have been modified as follows:

1. Two 41,000-ton battleships actually launched have been "scrapped" in the sense that they are not to be completed, but will be used as target ships for gunnery, torpedo and aircraft experiments. Two other battleships, each of 44,000 tons, that were to have been laid down this year and for which some equipment had been ordered, have been definitely abandoned, while the designs for two ships of still greater power, which were to have been named the *Mikasa* and *Fuji*—perpetuating the names of historic craft in the old navy—have been torn up. Six great battleships that otherwise would have formed the backbone of the Japanese fleet a few years hence have thus been ruled out. A similar fate has

befallen the battle cruisers that were authorized under the famous "eight-eight" program of 1920. *Amagi* and *Akagi*, originally designed for 43,500 tons, will finally emerge in the guise of airplane carriers with their displacement cut down by some 15,000 tons. Two sister ships, *Atago* and *Takao*, of which the keels were laid while the Conference was in session, have now been broken up and no longer exist, while the plans of four mightier battle cruisers that were scheduled to hoist the pennant in 1927-28 now repose in the limbo of "might-have-beens." Therefore, of the 14 Japanese mastodons that were building, completing or on the point of being commenced when the Conference reached its decisions, 12 have completely disappeared and two are building to a much smaller and feebler design. Moreover, 10 older capital ships, dreadnaughts and pre-dreadnaughts have been withdrawn from the active fleet and are now awaiting demolition, either at the hands of the shipbreaker or as victims of shell fire, torpedo or bombing attacks. Japan has consequently fulfilled both in letter and in spirit the terms of the limitation treaty so far as it concerns capital ships.

2. As already stated, the battle cruisers *Amagi* and *Akagi* are undergoing reconstruction as airplane carriers and when completed will displace 26,000 tons each, or 52,000 tons together. Since Japan is allotted 81,000 tons of these craft, a balance of 29,000 tons will remain. However, she is also building two new airplane carriers, the *Hoshu* and *Shokala*, the first named being a 9,600-ton ship, and it is considered probable that the *Shokaku* will turn out to be a much larger vessel, approaching 20,000 tons. In any case Japan will certainly develop her plane-carrying tonnage to the full limit sanctioned by the treaty.

3. Far-reaching schemes of port and harbor improvements at the Japanese naval bases—including the construction of several huge dry and floating docks—of Kure, Yokosuka and Sasebo have been abandoned. These works, which were estimated to cost $70,000,000, have ceased to be necessary owing to the deletion of so many monster fighting ships. For the same reason a big program of extensions at the gun and armor-plate factories of Kure and Yawata, which would have doubled their present output capacity, has been dropped. The naval stations at Port Arthur, Takeshiki and Bako in the Pescadores are all to be abolished, and those at Maidzuru and Chinkai will be reduced to secondary rank.

4. The naval personnel is this year to be cut by 12,000 officers and enlisted men. As, according to preconference arrangements, the personnel during 1922 was to have reached a total of 78,400, the reduced establishment will presumably be 66,400. In spite of this cut, however, the man power at the disposal of the Japanese navy will remain very considerable, for behind the active personnel is a trained reserve of at least 40,000. In an emergency Japan could probably mobilize more trained naval officers and seamen than the United States. Compared with the large number of ships which are to be scrapped, the reduction of personnel is small. All remaining ships are to have their complements increased and will thus be maintained on a footing of immediate readiness for action.

5. The grand fleet maneuvers which were to have been held in the coming fall are said to have been cancelled for reasons of economy.

At first glance the foregoing list of reductions seems very imposing, but it is qualified by a number of factors, the chief of which is that concurrent reductions on a far larger scale are taking place in the navies of Britain and the United States. Then, again, Japan is adopting a series of measures the cumulative effect of which will be to strengthen her naval power very considerably in everything but capital ships. These measures may be enumerated as follows:

1. The seven-year building program authorized in 1920 has been redrafted so far as it relates to auxiliary combatant ships, and the whole of these vessels which remain to be built have been designed afresh on a new basis of size and power. Construction will also be pushed forward to insure their coming into service well in advance of the dates first contemplated. The most important units of this revised program are four cruisers of 10,000 tons apiece. Steaming over 30 knots and mounting a battery of 8-inch 250-pounder guns, they will be the heaviest and most formidable cruising ships under any flag. No doubt the intention is for these vessels to replace in some degree the eight battle cruisers which Japan forfeits under the treaty. In addition, four small cruisers will be built, each displacing 7,000 tons, with very high speed and powerful rapid-fire armament, and storing sufficient oil fuel to endow them with a radius of 12,000 miles. When these eight vessels are ready the Japanese cruiser fleet—as I pointed out in a previous article—will comprise 29 modern ships with an aggregate displacement of 185,100 tons. It is true that Britain is completing four cruisers and the United States ten, but all of them are belated survivors of war programs and would ordinarily have been in service years ago. The eight Japanese ships are, on the contrary, part of a post-war program, and the improvements which their design has undergone will make them individually more powerful than the British or American vessels. I may add that all the new Japanese cruisers will be equipped to carry and launch airplanes.

2. Twenty-four big destroyers are to be built, each of 1,375 tons, with a speed of 36 knots and mounting four 4.7-inch rapid-fire guns. They will be the largest vessels of their type in the world, with the exception of 12 British flotilla leaders. The submarine construction program covers 24 new boats, of which a certain number will be ocean-going boats of 900 to 1,000 tons, and the remainder "cruiser submersibles" of 1,600 tons each, with a radius of 16,000 to 20,000 nautical miles. When they are completed will possess approximately 100 submarines, and 72 of these will be ocean-going boats with a range of action varying from 7,500 miles in the smallest to 20,000 miles in the largest types. No other navy has anything like as many submarines capable of undertaking prolonged ocean voyages. I have previously stated in *The Sun* that the Japanese submarine program was considerably more advanced than is generally known. For instance, the navy year-books show No. 50 as the latest boat building, whereas positive information reaches me that boats running well into the sixties have already been launched. The new building program further includes a number of colliers, oil-tankers, fleet repair ships and other auxiliaries.

3. Navy training is to be reorganized on the most modern and progressive lines. Larger appropriations will be made in future for research and experimental purposes, and for gunnery and torpedo practice. A higher standard of battle efficiency and especially in long-range firing, is to be demanded of the whole fleet, to which end its equipment will be thoroughly modernized. In a word, the Japanese battle fleet, small though it be, is to be developed into a compact hard-hitting force with a punch in every ton of displacement.

4. The navy air service is to be strengthened and generally improved. A big increase in the number of machines and personnel is contemplated, additional aerodromes are to be provided and training will be conducted on the most up-to-date principles. In due course every capital ship and light cruiser will be fitted to carry one or more fast combat planes.

5. The shore defenses along the coast lines of Japan are to be reinforced. It is planned to utilize for this purpose the heaviest of the guns taken out of scrapped capital ships. A special appropriation has been

made for developing the naval mine service, both for harbor defense and aggressive operations.

Turning now to her land armaments we find Japan preparing to cut down the standing army by 56,000 enlisted men, but at the same time it is clear from published statements by General Yamanashi, the war minister, that the bulk of the money thus saved is to be spent on new equipment, such as artillery, tanks and automobile transport. A start has already been made with the creation of new batteries of super-caliber howitzers and long-range guns.

In view of all this preparedness by sea and land it does not look as though the Washington Conference had weakened Japan's faith in the virtue of powerful armaments. She is now much stronger relatively than before, and her supremacy in the Far East is practically unassailable by direct military action.

To make assurance doubly sure she is gradually consolidating her influence in China, with the object of attaining such complete hold over the richest areas, particularly Manchuria and Mongolia, that their entire resources in foodstuffs, coal, iron and other products would be at her disposal in the event of war. So much has been virtually admitted by recent official utterances.—*The Baltimore Sun*, 28 July, 1922.

GERMANY

GERMANY AND THE RUSSIAN NAVY.—A writer in the current number of the French *Revue Universelle*, who signs himself Alain Mellet, is much perturbed at the prospect, which he regards as imminent, of Germany regaining a large measure of her former sea power by taking over the Russian Baltic fleet and constructing many new submarines in the Russian dockyards. After enumerating the supposed paper strength of the Baltic fleet, he draws attention to the four huge battle cruisers of the *Borodino* class which are not yet armed, though "news has reached Paris that arrangements are being made to effect their complete armament with the shortest possible delay." Information has also reached Paris that a German mission arrived at Kronstadt a few weeks ago and took complete command of the arsenals there. Another item of news which the writer of the article claims to have heard is that Germany has despatched to Kronstadt "more than 200 Diesel engines, all of which are certainly not reserved for Russian submarine use," and he infers therefrom that Germany is already using the Russian yards for the secret building of submarines.

Finally, he informs us that Russian naval maneuvers were to begin in the Baltic on July 6, Finland having been officially notified to this effect so that her fisherman might have due warning. This is not by any means the first time that the possibility of Russo-German naval cooperation has been discussed since the war, and the recently concluded Treaty of Rapallo—which is known to involve some military understanding, if not a definite agreement has, of course, brought such cooperation into the realm of probabilities. Nevertheless, inquiries made in well-informed quarters in London have failed to elicit any corroborative evidence of the positive statements made by M. Mellet. Nothing is known there of the arrival at Kronstadt either of a German naval mission or a large consignment of Diesel engines, and it is suggested that London as a rule is quite as well-informed on current Russian affairs as Paris.

A STAY-AT-HOME FLEET.—It is true there have been rumors that the Russian fleet would shortly carry out exercises in the Baltic. On the other hand, it is considered more than doubtful whether that fleet, or any considerable section of it, is at present in a condition to put to

sea, let alone engage in tactical maneuvers. About five years have elapsed since any Russian ship above the rank of destroyer was seen outside harbor, and even if the vessels themselves had been kept in good order during the intervening period, it goes without saying that their crews must have lost all touch with the rudiments of sea-going duty. In any case, therefore, the fighting efficiency of the Baltic fleet would be at a low ebb for a long time to come, and it would take more than a German naval mission to put the ships and crews into battle trim at short notice. There is, moreover, a strong suspicion that many of the vessels have deteriorated or been damaged beyond repair.

Without going into particulars, it may be said with confidence that at least half of the heavy ships named by M. Mellet as representing the future Baltic fleet under German command are useless for any service but harbor defence, and perhaps incapable even of that. As regards the complete arming of the four unfinished battle cruisers, this would necessitate the manufacture of not less than forty-eight 14-in. guns, with their mountings, accessories, ammunition, etc., without counting reserve pieces or the secondary armaments. In view of the chaotic state of Russian industry at present, it seems doubtful if this large ordnance contract could be executed within the early future. Although the work of manufacturing the artillery equipment of these vessels was begun late in 1912, slow progress was made, and it is believed that such of the guns as had been completed on the outbreak of war were requisitioned either for field or coast defence service.—*Naval and Military Record*, 12 July, 1922.

THE AFRICAN CRUISE OF ZEPPELIN L59.—In the spring of 1917 the German colonial troops in East Africa were almost ready to surrender to the Allies for lack of ammunition and hospital supplies. Accordingly, at the suggestion of the chief of the medical section of the German staff, the German war department decided to forward the needed supplies by airship. As this involved a journey of unprecedented length and with a great military load, a number of experiments to prove the feasibility of carrying out such a plan were ordered. The German army airship *LZ120* had succeeded in maintaining the air for 101 hr. just a few weeks previously, so no insuperable difficulties were anticipated.

Type of Airship Used

A preliminary investigation showed that an airship of the same type, but lengthened by 100 ft. and having a capacity of 2,365,000 cu. ft. would be required to carry the contemplated load of 14 tons over the 4460 miles of distance to be covered. Assuming a cruiser speed of 40 m.p.h., the trip was expected to be made in 110 hr. after the usual laboratory test, orders were given for the construction of the ship, and the work was begun without delay. This ship, called the *L57* was ready for its initial flight just four weeks afterward (Oct. 7, 1917). A sudden storm however, destroyed the ship while attempting a landing at Jüterborg.

In the remarkably short time of fourteen days the second ship was completed and christened the *L59*. Without further delay it was sent successfully to Jamboli, Bulgaria, the airbase of the German troops then operating in Roumania. After some further test flights the ship was loaded and "took off" for East Africa at 8.34 P. M. on Nov. 21, 1917.

While the *L59* was in the vicinity of Khartoum, on the Upper Nile, at Lat. 16° 30′ N., Long. 30° 0′ E. wireless information was received to the effect that the German troops had surrendered to the British and the ship was recalled to its base, where it landed at 7:35 A.M. on Nov. 25. The ship had been in the air uninterruptedly for 95 hr. and had

covered a distance of 4250 miles at an average speed of about 44 m.p.h.

From a technical viewpoint the trip was highly successful, and the results obtained show that had not political events intervened, the goal would have been reached in four day's flying without trouble. It was proven that airship transportation under the given conditions is eminently satisfactory and that large cargoes can be carried without difficulty for distances requiring several consecutive day's navigation.

The military load carried on this voyage by the *L59* was apportioned as follows:

Hospital supplies	6,548 lb.
Ammunition	16,354 "
Ordnance	7,191 "
Sewing outfits	440 "
Mail	116 "
Astronomical instruments	112 "
Books	116 "
	30,877 lb.

—*Aviation*, 31 July, 1922.

ANTECEDENTS OF GERMAN FLEET MUTINY.—Over two hundred machine-guns and large stocks of ammunition have been discovered at the Kiel naval arsenal by officers of the Inter-Allied Commission, the weapons so found being in excess of the number authorized by the Treaty of Versailles. As a Berlin correspondent truly remarks, that they should have been deliberately concealed on premises directly under the control of the German Government renders the case much more serious than that of the howitzers which were hidden in the Rockstroh factory near Dresden. The workmen at the arsenal are reported to be very indignant with the officials responsible for this concealment, and are said to have demanded their dismissal, though it is scarcely credible that the arms could have been hidden away without the cognizance of some of the men. To those who have been watching the reorganization of the German navy during the past three years there is nothing surprising in this discovery, for it has long been evident that the "Reichsmarine" has been brought largely under the control of the Monarchists. Naval officers, both active and retired, have been conspicuous in every counter-revolutionary movement, from the Kapp "Putsch" to the plots against leading members of the Republican administration. The German navy is itself a hotbed of reaction. All the "disaffected" elements have been weeded out. The officers, from the departmental chief, Admiral von Behncke, down to the youngest Fähnrich, are said to be ardent "Kaiser's men," and it is their boast that the lower-deck personnel have been carefully selected with a view to their political opinions. It is admitted, however, that the dockyard workers are still a doubtful quantity. Hence the proposal to close down all the existing naval bases with the exception of Wilhelmshaven, and concentrate all the shore establishments and facilities at that place, which could then be staffed exclusively by officials and men who were free from the taint of Republicanism.

A manifesto published in December, 1918, by the "Deck Officers' Union" (Deckoffizierbund), and representing "the unanimous conviction of 4,000 warrant and petty officers of the German navy, all of whom have served from 15 to 25 years," purported to explain the root cause of the deterioration of discipline which brought about the final collapse. The following is a summary of this interesting document:

"None will deny that up to the beginning of the 'nineties the spirit of our navy was excellent. At that time the connecting link between officers and men was, in the truest sense of the word, the warrant officer. Between all ranks and ratings there prevailed a sentiment of comradeship that found expression in the implicit confidence which the men reposed

in their leaders. However, soon after the accession of Emperor William the second a new spirit made itself manifest among the officers as a result of imperial favoritism. The consequence was that the naval officer tried to get rid of everything that tended to weaken his influence and prestige, and in the course of years the warrant officer was gradually ousted from his old position and reduced to the same level as the men. The connecting link was thus broken. Moreover, sea-men no longer aspired to warrant rank, which had ceased to mean a desirable career, and in the last years before the war all the best and most efficient men had cut loose from the service as soon as their time was up. Even between themselves and the so-called "specialist" officers, such as engineers, paymasters, etc., the executive officers had created a wide gulf both socially and in the service. By the outbreak of war the executive branch had constituted itself an hermetically-sealed corps. Working exclusively for their own interests, they cared nothing for the welfare of those subordinate to them, and were blind and deaf to the grievances of the men. The executive officer soon came to be regarded by the men as the embodiment of ignorance, pride, and arrogance, and in these circumstances it is not surprising that they eventually lost all confidence in their appointed leaders, regarding them with feelings of hatred and bitterness. Thus the blame for the collapse rests primarily with the officers, one and all of whom, from Tirpitz to the youngest sub-lieutenant, were animated by the pan-German spirit."—*Naval and Military Record*, 19 July, 1922.

GERMAN SUBMARINE LOSSES.—From German official sources comes the following statement of submarine losses during the war. The total number of submarines sunk, interned, and captured is given as 199. Thirty-one of these were sunk in the North Sea, and of these 3 in German coastal waters. In the Channel 56 were lost, and 12 more in its western approaches. Elsewhere on the coast of the British Isles 43 units were accounted for: 5 on the west coast of England, 18 on the east coast, 2 near Scapa Flow, 9 on the Irish coast, 7 in the Irish Sea, and 2 off the Shetlands.

In the Mediterranean 17 were sunk, 4 in the Black Sea, 2 in the Arctic, 2 in the Atlantic, and 3 in the Baltic. One was lost on the Danish coast, 2 on the French coast of the North Sea, 3 on the German coast, and 2 on the Belgian coast.

Five submarines were interned in Spain and 2 in Holland. Seven were destroyed at Pola, 1 at Caltaro, 1 at Trieste, 1 at Fiume, and 4 in Flanders before the German retreat.

In these units there were lost in all 517 officers and about 5,000 men.

UNITED STATES

Navy Department Bureau of Construction & Repair, Washington, D. C.

VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY—Progress as of June 30, 1922

Type Number and Name	Contractor	Per cent of Completion				Contract date of Completion	Probable date of Completion
		July 1, 1922 Total	July 1, 1922 On Ship	June 1, 1922 Total	June 1, 1922 On Ship		
BATTLESHIPS (BB)							
45 *Colorado*	New York S.B. Cpn.	92.7	92.3	92.3	91.8	.....	Indefinite
47 *Washington*	New York S.B. Cpn.	75.9	70.3	75.9	70.3	.....	Indefinite
48 *West Virginia*	Newport News S. B. & D. D. Co.	82.5	81.2	81.5	80.1	.....	Indefinite
49 *South Dakota*	New York Nvy. Yd.	38.5	31.6	38.5	31.6	.....	Indefinite
50 *Indiana*	New York Nvy. Yd.	34.7	27.2	34.7	27.2	.....	Indefinite
51 *Montana*	Mare Island Nvy Yd.	27.6	19.	27.6	19.	.....	Indefinite
52 *North Carolina*	Norfolk Nvy. Yd.	36.7	27.1	36.7	27.1	.....	Indefinite
53 *Iowa*	Newport News S. B. & D. D. Co.	31.8	27.4	31.8	27.4	7/12/23	Indefinite
54 *Massachusetts*	Beth. S.B. Cpn. (Fore River)	11.	4.3	11.	4.3	7/12/23	Indefinite
BATTLE CRUISERS (CC)							
1 *Lexington**	Beth. S.B. Cpn. (Fore River)	33.8	24.2	33.8	24.2	.....	Indefinite
2 *Constellation*	Newport News S. B. & D. D. Co.	22.7	19.5	22.7	19.5	.....	Indefinite
3 *Saratoga*	New York S.B. Cpn.	35.4	28.	35.4	28.	.....	Indefinite
4 *Ranger*	Newport News S. B. & D. D. Co.	4.	1.5	4.	1.5	.....	Indefinite
5 *Constitution*	Philadelphia Nvy. Yd.	13.4	8.4	13.4	8.4	.....	Indefinite
6 *United States*	Philadelphia Nvy. Yd.	12.1	7.1	12.1	7.1	.....	Indefinite
SCOUT CRUISERS (LIGHT CRUISERS) (CL)							
4 *Omaha*	Todd D.D. & Const. Cpn.	99.2	94.8	99.2	94.8	8/ 1/21	Indefinite
5 *Milwaukee*	Todd D.D. & Const. Cpn.	95.8	92.9	95.	90.4	12/ 1/21	Indefinite
6 *Cincinnati*	Todd D.D. & Const. Cpn.	88.2	83.8	88.2	82.6	7/ 1/22	Indefinite
7 *Raleigh*	Beth. S.B. Cpn. (Fore River)	69.2	54.3	67.4	51.4	8/ 1/21	Indefinite
(a) 8 *Detroit*	Beth S.B. Cpn. (Fore River(	88.5	80.	86.4	77.1	11/ 1/21	10/ 1/22
9 *Richmond*	Wm. Cramp & Sons Co.	93.	87.4	92.	86.	.....	10/ 1/22
10 *Concord*	Wm. Cramp & Sons Co.	86.5	79.5	86.	79.	.....	1/ 1/23
11 *Trenton*	Wm. Cramp & Sons Co.	59.5	47.5	59.5	47.5	10/ 1/21	6/ 1/23
12 *Marblehead*	Wm. Cramp & Sons Co.	47.5	33.5	47.5	33.5	1/ 1/22	0/ 1/23
13 *Memphis*	Wm. Cramp & Sons Co.	40.5	26.5	40.5	26.5	4/ 1/22	8/ 1/23
AUXILIARIES							
Repair Ship No.1,	*Ledusa* (AR1) Puget Sd. Nvy. Yd	83.4	74.2	81.9	72.5	.....	Indefinite
Dest. Tender No.3,	*Dobbin* (AD3) Phila. Nvy. Yd.	72.5	72.3	71.9	71.6	.....	Indefinite
Dest. Tender No.4,	*Whitney* (AD4) Boston Nvy. Yd.	57.6	50.3	54.5	48.2	.....	Indefinite
Sub. Tender No.3,	*Holland* (AS3) Puget Sd. Nvy. Yd.	21.5	5.5	21.5	5.5	.....	Indefinite
PATROL VESSELS							
Gunboat No. 22, Nvy. Yd.	*Tulsa* (PG22) Charleston	75.	64.9	74.	63.7	.....	Indefinite
DESTROYERS							
No. 339 *Trever*	Mare Island Nvy. Yd.	99.8	99.8	99.8	99.8	.....	.....
No. 340 *Perry*	Mare Island Nvy. Yd.	99.8	99.8	99.8	99.8	.....	.....
No. 341 *Decatur*	Mare Island Nvy. Yd.	99.5	99.5	97.	97.	.....	7/15/22

Destroyers authorized but not under construction or contract.
(12) Nos. 348 to 359 inclusive. Number Ready for commissioning.
a Scout (Light) Cruiser No. 8—*Detroit*—Launched June 29, 1922.
* Ordered converted to Airplane Carrier.

VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY—Progress as of June 30, 1922

Type Number and Name	Contractor	Per cent of Completion July 1, 1922 Total	On Ship	June 1, 1922 Total	On Ship	Contract date of Completion	Probable date of Completion
		SUBMARINES					
115 *S-10*	Portsmouth, N.H., Nvy. Yd.	96.6	96.	96.4	95.7	.....	9/15/22
116 *S-11*	Portsmouth, N.H., Nvy Yd.	94.8	94.1	94.7	93.8	.....	Indefinite
117 *S-12*	Portsmouth, N.H., Nvy. Yd.	93.9	92.5	93.8	92.3	.....	Indefinite
118 *S-13*	Portsmouth, N.H., Nvy. Yd.	92.9	90.9	92.7	90.6	.....	Indefinite
123 *S-18*	Elec. Boat Co. (Quincy)	98.5	98.5	98.5	98.5	7/ 1/22	.....
124 *S-19*	Elec. Boat Co. (Quincy)	98.	98.	98.	98.	9/30/22	.....
125 *S-20*	Elec. Boat Co. (Quincy)	98.5	98.5	98.5	98.5	10/30/22	.....
126 *S-21*	Elec. Boat Co. (Quincy)	97.5	97.5	97.5	97.5	10/30/22	.....
127 *S-22*	Elec. Boat Co. (Quincy)	98.5	98.5	98.5	98.5	10/30/22	.....
128 *S-23*	Elec. Boat Co. (Quincy)	98.5	98.5	98.5	98.5	11/30/22	.....
129 *S-24*	Elec. Boat Co. (Quincy)	95.5	95.5	94.5	94.5	11/30/22	.....
130 *S-25*	Elec. Boat Co. (Quincy)	98.	98.	96.5	96.5	11/30/22	.....
131 *S-26*	Elec. Boat Co. (Quincy)	94.	94.	93.5	93.5	12/30/22	.....
132 *S-27*	Elec. Boat Co. (Quincy)	92.5	92.5	92.	91.5	12/30/22	.....
133 *S-28*	Elec. Boat Co. (Quincy)	93.	92.7	92.5	92.2	12/30/22	.....
134 *S-29*	Elec. Boat Co. (Quincy)	92.	91.5	91.5	90.7	1/30/23	.....
*135 *S-30*	Elec. Boat Co. (San Fran)	.....	.....	.....	.....	1/30/23	.....
*136 *S-31*	Elec. Boat Co. (San Fran)	.....	.....	99.5	99.5	1/30/23	.....
137 *S-32*	Elec. Boat Co. (San Fran)	99.5	99.5	98.	97.8	2/28/23	.....
*138 *S-33*	Elec. Boat Co. (San Fran)	.....	.....	.....	.....	2/28/23	.....
139 *S-34*	Elec. Boat Co. (San Fran)	98.2	98.	96.9	96.4	2/28/23	.....
140 *S-35*	Elec. Boat Co. (San Fran)	95.7	95.1	95.	94.3	3/30/23	.....
141 *S-36*	Elec. Boat Co. (San Fran)	94.6	93.9	93.6	92.6	9/20/22	10/10/22
142 *S-37*	Elec. Boat Co. (San Fran)	93.5	92.6	92.9	91.9	10/10/22	10/25/22
143 *S-38*	Elec. Boat Co. (San Fran)	89.8	88.	89.3	87.4	10/30/22	11/10/22
144 *S-39*	Elec. Boat Co. (San Fran)	87.1	84.7	86.9	84.5	11/19/22	11/25/22
145 *S-40*	Elec. Boat Co. (San Fran)	84.9	81.9	84.7	81.7	12/ 9/22	12/11/22
146 *S-41*	Elec. Boat Co. (San Fran)	87.	84.5	86.8	84.3	12/29/22	12/26/22
153 *S-42*	Elec. Boat Co. (Quincy)	87.5	77.	86.3	75.4	5/15/23	.....
154 *S-43*	Elec. Boat Co. (Quincy)	88.5	78.8	87.4	77.3	6/15/23	.....
155 *S-44*	Elec. Boat Co. (Quincy)	86.	75.	84.9	73.5	6/15/23	.....
156 *S-45*	Elec. Boat Co. (Quincy)	86.8	76.	85.6	74.4	7/15/23	.....
157 *S-46*	Elec. Boat Co. (Quincy)	85.3	73.9	84.	72*1	7/15/23	.....
158 *S-47*	Elec. Boat Co. (Quincy)	85.1	73.7	84.1	72.3	8/15/23	.....
159 *S-48*	Lake T.B. Co. (Bridgeport)	98.3	98.3	98.3	98.3	7/ 1/21	9/ 2/22
160 *S-49*	Lake T.B. Co. (Bridgeport)	Del. 6/5/22		99.6	99.6	8/ 1/21	.....
162 *S-51*	Lake T.B. Co. (Bridgeport)	Del. 6/24/22		99.2	99.2	10/ 1/21	.....
		FLEET SUBMARINES					
163 *V-1*..(SF4)	Portsmouth N.H. Nvy. Yd.	25.7	24.5	24.1	22.9	.....	10/-/24
164 *V-2*..(SF5)	Portsmouth N.H. Nvy. Yd.	22.5	.....	21.9	.....	.....	.....
165 *V-3*..(SF6)	Portsmouth N.H. Nvy. Yd.	22.3	.....	21.8	.....	.....	.....

Note: Submarines authorized but not under construction or contract:
Fleet Submarines (6) Nos. 166-171. Neff Submarine (1) No. 108.

* Hull complete. Engineering work only.

DEFENSE PLANS FOR AMERICA.—Washington, July 23.—For the first time in American military history definite defense plans, one for the land forces and the other for the sea forces, have been drafted by the experts of the two services.

That proposed by the navy department will round out the United States navy in accordance with the provisions of the Washington Armament Treaty, if Congress grants the requests to be presented. These

requests will recommend a building program of light cruisers, submarines and other auxiliary war craft.

Pershing Submits Army Plan

The program for the army, drafted after months of study by the general staff, was framed in accordance with the terms of the National Defense act of 1920. Military experts believe it would serve successfully to defend continental United States against any sudden attack and at the same time would amply provide for general mobilization behind the lines of defense.

An outline of the army plan was submitted in the form of a memorandum to Secretary of War Weeks by General John J. Pershing, chief of staff. It was described by General Pershing as a "national position in readiness."

To Conform to Other Programs

The purpose of the navy plan is to conform to the building programs of England and Japan and to preserve the existing 5-5-3 ratio among the three leading naval powers.

For several months the general board, in co-operation with the heads of the navy's technical bureaus and under the supervision of the chief of operations, has been working on plans for rounding-out the new navy.

For the first time in its history the United States has a definite naval policy. This was automatically fixed by the naval limitation treaty. While in letter the treaty defines the battleship ratio only, in spirit, the same ratio applies to the auxiliary craft on which no limitations were placed except that the maximum tonnage of any craft could not exceed 10,000 tons. Our naval policy therefore is to build only enough tonnage of various types to round out our navy and maintain it on the same relative footing with the other two.

Some time ago a tentative building program was submitted to the general board for consideration as a working basis for the recommendations the board is expected to submit to the Secretary before the opening of the next Congress. Of course, no battleship building is contemplated except the completion of the *West Virginia* and *Colorado,* as the replacement of the older ships will not begin until 1931. The program is understood to provide in part:

To Keep Pace with Japan

1. Completion of the 10 light cruisers now building and authorization for starting work on a sufficient additional number to keep pace with the British and Japanese.

2. Construction of several submarines of the scout and mine-laying type in addition to finishing the three fleet under-water boats now being built.

3. A more rapid development of aviation, specializing in new types of planes and completion of the two huge airships, one in Germany and the other at Lakehurst, N. J.

For Aircraft Carriers

4. An increase in funds allotted to the conversion of the two new battle cruisers into aircraft carriers so as to expedite as much as possible the completion of these two badly needed units of the fleet.

These are the high lights of the tentative program now under consideration, and it is being worked out with the expressed intention of making the treaty navy the most effective one possible.

High naval officials are watching with keen interest the naval plans in Japan as a result of her expressed intention of building additional

cruisers, submarines and destroyers. These officials believe that to obtain the best results from the limitations conference it is imperative that the status quo in auxiliary war craft, as well as in battleships, be maintained so that when the nations meet again around the council tables to renew the pacts the relative strength will still be in the ratio it now has.

Shows Only Slight Reduction

According to the best information obtainable, making due allowances for the apparent discrepancies, for instance, in Baron Kato's recent outline of Japan's naval program and other sources equally as authoritative, the Japanese building program at present shows a reduction of a little less than 14,000 tons from the very ambitious pre-conference "8-8 program," an insignificant figure compared to the total.

This old program called for 26 cruisers of 146,750 tons, 94 destroyers of 102,566 tons and 93 submarines of 82,852 tons, a grand total to be built of 331,168 tons. This, of course, does not include any mention of airplane carriers, submarine tenders, gunboats, tankers and other smaller auxiliaries.

Tokio Plans Affect U. S.

While there is no disposition on the part of naval officers here to question the sincerity of Japan in regard to her building plans and general naval policy, they believe there are certain phases of this policy that should have a direct bearing on our own future plans.

One of the interesting changes that Japan has made in her program since the Conference is the substitution of four 10,000-ton cruisers, the limit in size cruisers of 5,500 tons each, as originally planned.

In the matter of cruisers the American navy is "out of the running" in competition with England and Japan, having none now and only 10 building, while Japan has 17 built or contracted for, and England has 45.

Because of the sweeping reduction in the size of the regular army, ordered by the present Congress, the general staff has faced a difficult problem in reorganizing the actual and potential military forces of the country for a possible emergency. The plans so far drawn do not take into consideration an offensive war, but are confined, for the time, to insuring the country against an enemy assault upon the United States coasts, until the full military power of the nation could be brought into play.

Would Prevent Landing

The important phase of the new system is a distribution of the trained or semi-trained military forces to so cover the coasts and frontiers of the country that no enemy landing would be possible. To this end the war department, of course, leans heavily upon the navy as well as upon its own coast defense fortifications.

"With 18 divisions and appropriate auxiliaries of the National Guard, supplemented by the regular army, prepared for necessary expansion," the General says in his report to Secretary Weeks, "and with certain special units formed in the organized reserves, we shall be able to cover our coasts and land frontiers against serious invasion at the start."

Would Give Time for Training

"Behind this first line," the General continues, "the remaining units of the organized reserves, fully constituted with a framework of officers and non-commissioned officers, will be prepared to undertake the training of their raw recruits at once. We shall thus be able deliberately to develop our military power to any necessary extent without risk of serious disaster through surprise at the outbreak of war and without

the necessity of maintaining a burdensome military establishment in time of peace."

Such a military organization as is now planned causes no menace to any other nation, the general staff insists, but assures the impregnability of continental United States in the event of attack by any possible hostile combination.

It is recognized by General Pershing and his associates that the citizen components of the army only can be partially trained before actual mobilization. While national defense, it is pointed out, includes more than the security of the United States against an attack, the initial accomplishment of that security will afford time for the orderly development of the country's great military resources.

Pershing Cites Illustration

"For the purpose of illustration," General Pershing says in his memorandum, "let it be assumed that a National Guard division is assigned the initial mission of defending a given beach sector. Upon mobilization the combatant elements of this division at peace strength would be ordered to a training area within reach of this sector, which would be prepared for defense.

"Thereafter it would be practicable to complete the mobilization, equipment and training of the division at war strength. Continuous development in the beach position would not be necessary after its preparation for defense. The troops could be moved back to a convenient training area, and could rely upon naval and air reconnaissance to give ample warnings of a possible attack."

It is obvious, the General further points out, that this plan will greatly simplify training, equipment and mobilization projects. There will be one course of training and development designed to prepare the troops for such further military operations as may be required. This latter course of training will make provision for the development of the full offensive strength necessary to victory.

Holds Initial Advantage

"The character of our military resources," the General declares, "as well as our attitude toward other nations, imposes upon us an initial strategic defensive. But this does not involve renouncing a subsequent offensive. Had the United States in the spring of 1917 possessed 25 or 30 divisions completely organized and equipped, but only sufficiently trained to meet the requirements of the 'national position in readiness' now outlined, each of these divisions would have been advanced many months as compared with the entirely new divisions that it was necessary to create."—*The Baltimore Sun*, 24 July, 1922.

THE NAVAL RESERVE.—In his hearings before the Senate Naval Committee, Captain J. P. Parker, U. S. N. R. F., president of the Naval Reserve Officers' Association, reviewed the whole naval reserve problem in a most comprehensive way. He showed convincingly not only why an adequate reserve is necessary, but also of what its essentials should consist, and in what manner they could be obtained.

Captain Parker pointed out that the question of cost must necessarily prevent any nation from maintaining during peace a regular navy large enough for war purposes. Yet when war comes the need for rapid augmentation of naval forces manned with competent personnel is urgent. Only a naval reserve can meet such need, and the smaller the reduction of regular forces during peace, below war requirements, the larger should be the reserve.

Considering the great waste of funds necessarily incidental to undertaking war when not prepared, a naval reserve force is manifestly an economy. But it is more than insurance against great monetary loss. No matter how much money is wasted in going to war, it cannot insure national safety unless those who go out to fight are efficient. At the outbreak of war there is normally an abundance of men sufficiently patriotic to volunteer in the navy. But few of them ever possess sufficient, naval efficiency, in any form. Training preliminary to service is indispensable if defeat and useless waste of life are to be avoided.

Captain Parker says: "Efficiency is a combination of knowledge and discipline. Knowledge is gained by work, but discipline comes from practice, something that has got to be learned by constantly living under certain conditions. Correct habits of a military character cannot be acquired in a day. They must be practiced constantly until the brain and the body learn to react under service conditions. The result is there is more to a sailor than the uniform he wears. He must have a military way of thinking and acting, so that his brain and his body will react properly under service conditions. Civil life does not teach these things. We must train a civilian until he has reached a stage of usefulness to the navy. The navy must be able to count on him, knowing his deficiencies as well as his effectiveness."

During the last war three month's preliminary training was considered indispensable before a man could even be assigned afloat. In a rational sense, he was not then a trained man. But the exigencies were such that partial training had to suffice. Three months may be taken as the minimum time that must be devoted to training ashore before a recruit is fit to be sent afloat. Can we afford to wait three months after the next war begins before placing our fleet in a status even approaching a war footing? Decidedly not. In war nearly everything can be afforded except loss of time. The necessary additional personnel to mobilize the fleet must be trained in advance of war.

There are about 350,000 ex-naval reservists in the country whose naval experience is a valuable asset, and will continue to be so if short intervals of training are repeated yearly. Otherwise they will lose their naval value rapidly. The House omitted from the naval appropriation bill any funds for such purpose. Fortunately the Senate was persuaded to provide sufficient money to perpetuate a nucleus of 6,000 officers and 10,000 men during the coming fiscal year. Meantime it is hoped that the navy department's plan of reorganization for the naval reserve can be put into effect, and that hereafter funds for the training of a much larger number will be appropriated.

Captain Parker testified that in order to hold this nucleus to start building up this reserve we need these three things: "*Cruises,* in order that they maintain efficiency; meeting places or *armories,* where they can meet together for drills and instruction, and, in order to put them on a parity with the land volunteer forces, *drill pay* for those drills."—*Army and Navy Journal,* 8 July, 1922.

NAVAL RESERVE STRENGTH FIXED AT 1,500 OFFICERS AND 5,000 MEN.—The strength of the naval reserve was tentatively fixed at 1,500 officers and 5,000 men at a conference between Acting Secretary of the Navy Roosevelt and representatives of the reserve which concluded on July 19. The naval reserve were represented by Captain Edward A. Evers, of Chicago; Captain James T. Parker, of Boston, and Lieutenant Commander R. T. Brodhead, of Detroit. Officers from the different bureaus and Captain Ernest L. Bennett, U. S. N., in charge of the reserve section of the navy department, participated in the conference.

Under the provisions of the naval appropriation bill, $3,000,000 was appropriated for the maintenance and training of the naval reserve. Of this $200,000 is to be expended for the rent and other expenses of maintaining armories and offices for the reserves.

The task before the conference was to allocate $2,800,000, which, under the provisions of the law, is to be expended on the pay of reserve officers on active duty with the reserves, the maintenance of ships, the pay of officers and men while attending maneuvers and taking training.

After an extended discussion of all of the expenses connected with the two weeks' training period and other maneuvers of this summer it was decided that there would probably be sufficient funds to place 1,500 officers and 5,000 men upon the retainer pay basis. Under the plans proposed this many officers and men will be transferred from Class 6 to Class 1 on January 1. Plans are being worked out under which the transfer will be made by the navy department before that date. In all probability no officer or enlisted man who does not take the training this summer will be eligible for retainer pay.—*Army and Navy Journal*, 29 July, 1922.

MERCHANT MARINE

EX-GERMAN TONNAGE ACQUIRED BY TRANSATLANTIC LINES.—With the sale to the Royal Mail Steam Packet Company of the steamer *Muenchen*, the last of the vessels which Germany was compelled to surrender under the terms of the peace treaty, it is now possible to tabulate the amount of ex-German passenger tonnage acquired by the leading transatlantic steamship lines. Of the 32 freight and passenger vessels of 612,751 tons mentioned in the sojourning list, 15 of 256,918 tons belong to the United States Government. The seven of 94,817 tons marked with a star have never been reconditioned and may never take to the seas again. Among the private shipping concerns the White Star Line acquired the greatest amount of German passenger tonnage and the French Line the least.

The following table shows the amount of ex-German tonnage acquired by the various transatlantic lines since the outbreak of the war:

	Tons	Tons
CANADIAN PACIFIC		
Empress of Australia, ex-*Tirpitz*	21,400	
Empress of India, ex-*Prinz Friedrich Wilhelm*	17,099	
Empress of Scotland, ex-*Kaiserin Auguste Victoria*	24,581	
		63,080
CUNARD LINE		
Berengaria, ex-*Imperator*	52,022	52,022
FRENCH LINE		
La Bourdonnais, ex-*Scharnhorst*	8,388	
Roussillon, ex-*Goeben*	8,800	
		17,188
GREEK LINE		
Constantinople, ex-*Bremen*	11,540	
King Alexander, ex-*Cleveland*	16,960	
		28,500
ITALIAN GOVERNMENT		
Ferdinando Pallasciano, ex-*Koenig Albert*	10,643	
Pessaro, ex-*Moltke*	12,235	
		22,878
ROYAL MAIL		
Ohio, ex-*Muenchen*	18,000	18,000
UNITED AMERICAN LINES		
Mount Clay, ex-*Prinz Eitel Friedrich*	8,170	
Reliance, ex-*J. H. Burchard*	19,582	
Resolute, ex-*William Oswald*	19,563	
		47,315

UNITED STATES GOVERNMENT		
*Agamemnon, ex-Kaiser Wilhelm II**	19,361	
America, ex-Amerika	22,622	
City of Honolulu, ex-Friedrich der Grosse	10,688	
City of Los Angeles, ex-Grosser Kurfuerst	12,642	
George Washington	23,788	
Leviathan, ex-Vaterland	54,281	
*Mercury, ex-Barbarossa**	10,980	
*Mount Vernon, ex-Kronprinzessin Cecilie**	18,372	
*Nansemond, ex-Pennsylvania**	13,332	
*Philippines, ex-Bulgaria**	11,440	
*Pocahontas, ex-Princess Irene**	10,352	
President Arthur, ex-Princess Alice	10,421	
President Fillmore, ex-Hamburg	10,532	
*President Grant**	18,072	
Susquehanna, ex-Neckar	9,835	
		256,518
WHITE STAR LINE		
Arabic, ex-Berlin	17,324	
Homeric, ex-Columbus	33,526	
Majestic, ex-Bismarck	56,000	
		106,850
		612,351

—*Nautical Gazette*, 22 July, 1922.

REVISED LIST OF SHIPPING BOARD'S PASSENGER LINERS.—The United States Shipping Board has given out the following revised list of new names for the so-called "state" boats and ex-German liners:

New Name	Old Name	Length—B. P.
President Van Buren	*Old North State*	502′
President Hayes	*Creole State*	502′
President Polk	*Granite State*	502′
President Monroe	*Panhandle State*	502′
President Harrison	*Wolverine State*	502′
President Adams	*Centennial State*	502′
President Garfield	*Blue Hen State*	502′
President Madison	*Bay State*	518′
President Roosevelt	*Peninsular State*	518′
President McKinley	*Keystone State*	518′
President Wilson	*Empire State*	518′
President Harding	*Lone Star State*	518′
President Lincoln	*Hoosier State*	518′
President Pierce	*Hawkeye State*	518′
President Taft	*Buckeye State*	518′
President Grant	*Pine Tree State*	518′
Pan America	*Palmetto State*	518′
Western World	*Nutmeg State*	518′
American Legion	*Badger State*	518′
Southern Cross	*Gopher State*	518′
President Jefferson	*Beaver State*	518′
President Cleveland	*Golden State*	518′
President Jackson	*Silver State*	518′
President Filmore	*ex-Hudson*	*
President Arthur	*ex-Princess Matoika*	*
City of Los Angeles	*ex-Aeolus*	*
City of Honolulu	*ex-Huron*	*

*Ex-German.

—*Nautical Gazette*, 15 July, 1922

GAIN IN TONNAGE FOR MONTH OF MAY.—The department of commerce's monthly summary of our foreign commerce shows that in May of this year many more American vessels cleared from American ports in the foreign trade than in May, 1921, while the tonnage of foreign vessels in similar trades showed a sharp decline. The exact figures are set forth in the following table:

	American Net Tons	Foreign Net Tons
May 1921	2,113,881	2,910,341
May 1922	2,621,206	2,553,505

It will be seen that the total amount of tonnage both American and foreign is approximately the same in both months, therefore no marked increase in the volume of trade has been recorded. It will also be observed that the American tonnage was increased by an amount almost equivalent to that lost by foreign countries. Therefore the explanation lies in the fact that American ships were able to capture business from foreign ships. This means that American competition is proving effective and that our flag is becoming more firmly established on the seven seas. Herein lies reason for hopefulness and gratification for it means that the shipping board is not spending money in vain. It is admitted that the cost of the American merchant marine is a heavy Government expense, but if, as these figures show, the desired end, that of establishing our mercantile fleet in world trade, is attained, then the cost is justified.

In analizing these statistics it must be borne in mind that conditions are far from normal, and that these satisfactory results are in a large measure due to the fact that the major portion of our merchant marine is government owned. The trade of the world is still in a state of depression and foreign ships find it difficult to operate profitably. These ships, however, are almost entirely privately owned, and the owners are not financially able to bear the losses arising from operation. Hence, numbers of foreign ships have been laid up.

On the other hand the American mercantile fleet is largely government owned, and the vessels are kept on their routes in spite of heavy operating losses. In the operation of its tonnage the shipping board is losing in the neighborhood of $3,000,000 per month, an amount which no private concern could bear. Therefore a larger proportion of foreign trade is coming to American ships, and although money is being lost, the fact remains that our merchant marine is gradually being built up and our competition is being keenly felt. In other words, American vessels have recaptured the lead from foreign ships as regards tonnage employed in the foreign trade out of American ports which they held in the fiscal year 1919-20. This should give a good impetus to the future development of our mercantile fleet.—*The Nautical Gazette*, 29 July, 1922.

U. S. PASSENGER SHIPS IN TRANSATLANTIC TRADE.—When the war broke out there were only six passenger steamers of 70,372 tons flying the Stars and Stripes plying to Europe. These were the *St. Paul*, *St. Louis*, *New York* and *Philadelphia* of the American Line and the *Kroonland* and the *Finland* of the Red Star Line. At present there are 26 American flag steamers engaged in the transportation of passengers between this port and Europe. Their names, tonnage and the number of passengers which they can accommodate are shown in the following table:

	Gross Tons	Number Passengers
UNITED STATES LINES		
George Washington	23,788	2,168
America	21,144	2,668
President Harding	14,187	500
President Roosevelt	14,187	490
President Adams	10,558	683
President Van Buren	10,533	156
President Polk	10,533	152
President Garfield	10,558	78
President Monroe	10,533	78
President Arthur	10,421	1,727
Susquehanna	9,959	1,366
	146,401	10,066

UNITED AMERICAN LINES		
Mount Clay	8,170	1,433
Mount Carroll	7,469	1,272
Mount Clinton	7,509	1,278
Reliance	16,191	1,095
Resolute	17,299	1,200
	56,638	6,278
AMERICAN LINE		
St. Paul	10,230	988
Manchuria	13,638	1,698
Mongolia	13,638	1,795
Minnekahda	17,281	2,150
	54,787	6,731
RED STAR LINE		
Kroonland	12,241	1,331
Finland	12,222	1,396
	24,463	2,727
NEW YORK & NAPLES S. S. CO.		
Philadelphia	10,232	1,340
AMERICAN BLACK SEA LINE		
Acropolis	5,083	740

—*The Nautical Gazette*, 22 July, 1922.

WORLD'S SHIPBUILDING NOT UP TO TOTAL REACHED BEFORE WAR.—World shipbuilding today is actually below the pre-war level, says a statement just issued by Lloyd's register of shipping. The decrease in production has been steady since the fall of 1919, and the volume of new orders continues to be far below the completion of orders in hand.

While the returns for the quarter ended July 1 show that the aggregate of contracts in hand is nearly 800,000 gross tons more than the total of work have been directed by those who placed the orders that the actual volume of construction actively under way is slightly below the pre-war figure.

The actual construction under way at present, as compared with that just before the war, is given below:

	July 1, 1914 Gross tons	July 1, 1922 Gross tons
United Kingdom	1,722,000	1,438,504
United States	148,000	150,623
Other countries	626,000	875,303
World total	2,496,000	2,464,430

The gross aggregate of tonnage on July 1, as compared with the previous quarter, was as follows:

	July 1	April 1
United States	150,623	136,266
United Kingdom	1,919,504	2,235,998
Other countries	1,165,303	1,307,358
World total	3,235,430	3,679,622

Stoppages ordered on this work fell more heavily on British shipyards than on those of all the other maritime nations combined. This is shown in the following table:

	Britain Gross tons	Others Gross tons
Work contracted	1,919,504	1,315,926
Less suspensions	481,000	290,000
Actual work	1,438,504	1,025,926

Although there has been a sharp shrinkage in the gross aggregate of tonnage in hand during the past three months, the total for the shipyards of the United States shows a small gain. On April 1, the American aggregate was lower than before the war, but on July 1 it was slightly above the pre-war figure. This country, however, was practically the only one in the world to show a gain during the past quarter.

The world construction now actually under way shows a decline of nearly 5,600,000 gross tons from the peak, which was attained in September, 1919, when 8,048,000 tons were being built. This country's present total of 150,000 tons, compared with the high level of 4,186,000 tons reached in the first quarter of 1919, shows a decrease of more than 95 per cent. It is interesting to note that the relative proportions of the world's shipbuilding have changed considerably since the pre-war period. Great Britain, which then had 69 per cent of the total, now has only 58 per cent; the United States has still its 6 per cent as in 1914; and the other countries have increased their share from 25 per cent to 36 per cent.

Declines continue to be shown in the returns covering the construction of tankers throughout the world, but more than 500,000 gross tons of this type of vessel are still under construction. The decrease since the first of this year is shown in the following table (figures in gross tons):

	Jan. 1	July 1
United States	103,000	60,880
United Kingdom	536,000	383,221
Other countries	154,000	85,810
World total	793,000	529,911

Returns of launchings and new work for British shipyards show that the output still continues markedly in excess of the volume of new work. During the three months ending July 1 launching in the United Kingdom aggregated 148,606 gross tons, compared with work begun on new vessels which will have a total tonnage of ony 37,987 tons. A slowing down in output, however, is indicated by a comparison with the returns for the previous quarter, when launchings represented 333,000 tons, as against new work totaling 49,000 tons.

The total of work now under way in German shipyards is estimated by Lloyd's register to be 500,000 gross tons, or over 200,000 tons more than for any other country in the world except Great Britain. Danzig is reported to be building 45,000 tons of merchant ships.

Of the smaller shipbuilding countries, Italy, France and Holland still retain their lead, in the order named. All, however, show declines from their figures for the quarter ended April 1. The July 1 returns for these countries compare with the April figures as follows (in gross tons):

	July 1	April 1
Italy	285,671	311,888
France	243,290	286,255
Holland	226,318	258,240
Japan	115,512	117,312
British Dominions	49,960	63,502

—*The Nautical Gazette*, 15 July, 1922.

ENGINEERING

THE NEW SHIP CRANE FOR THE NAVY.—The navy has recently awarded a contract for the construction of a two hundred and fifty ton revolving crane mounted on the hull of the United States battleship *Kearsarge*.

The crane will be so constructed that the crane-ship will be seaworthy, as it is the intention to transport the ship, under its own power, with turrets and guns on board, to any port where the crane service is required. This will be the largest sea-going crane ever constructed.

Preparatory to the mounting of the crane, the guns, turrets, and armor will be removed, and a circular steel foundation, sixty feet in diameter, will be constructed on the deck. To this foundation, the rails for the rotating structure will be secured; for the crane will be of the rotary, hinged jib type. Bulges will also be constructed along each side of the present hull of the *Kearsarge* to produce additional transverse stability, making a total beam of ninety-two feet.

The crane proper will consist of a rotating platform to which the jib will be hinged. The jib will be an enormous structure, even in itself, for it is required to handle its maximum loads at far reaches and great heights. Two main hoist blocks, each having a capacity of one hundred and twenty-five tons, will be suspended from the jib, side by side, from sheaves fixed in the structure. A forty-ton auxiliary block will be suspended from a trolley which travels lengthwise of the jib between the main hoists.

An equalizer, with a single hook, will be used to connect the main hoist blocks together when handling the maximum load of two hundred and fifty tons.

The jib will be capable of luffing, in a vertical plane, about its hinge pins, this motion being obtained by two massive screws which operate nuts attached to the elbow of the jib and to a steel back frame built up at the back of the rotating platform. The range of these screws is sufficient so that the jib may be luffed to all working positions and also to a position approximately horizontal, when its outer end will rest in a cradle, provided at the after end of the ship for this sea-going or transport position. After the jib has been lowered into the cradle, the entire rotating structure is locked by means of motor operated wedges, to prevent rotation. A special device will also be arranged so that the screws can be slacked off to allow the jib to rest securely in the cradle.

The rotating platform will rotate about a central pivot located within the circular foundation. A system of equalized trucks, attached to the platform, will travel on heavy rails attached to the foundation. There will be four rings of these rails, located in pairs, four feet apart and having a mean diameter of sixty feet.

Intermediate between the rails a bevel gear ring will be attached to the foundation, and meshing with this gear will be two bevel pinions which will be connected to separate driving motors on the rotating platform. These pinions will be diametrically opposite at each side of the platform so that deflections in the structure under load will not affect the mesh of the teeth.

All of the hoisting and rotating machinery will be carried on the rotating platform, ropes from the drums being led around deflecting sheaves in the back frame and thence to the hoist sheaves in the jib.

The various functions of the crane will be controlled from an operating tower located at the right side of the jib, on the rotating platform. From this station, high above the deck, the operator will hoist or lower the loads hanging on the hook blocks, move the auxiliary trolley in or out on the jib, luff the jib or down, or rotate the entire crane. There is no manual labor connected with these operations. All of the motors

are governed by automatic control and the operator is reuired only to turn the small handles of his master controllers to make the giant do his bidding.

The back of the rotating platform will be counterweighted to compensate for the eccentricity of the extreme weights which the crane will handle. For this purpose it is proposed to use about four hundred tons of the old armor plate removed from the ship. This will first be placed in position and then imbedded in concrete to secure it in place.

For the operation of the various functions of the crane, direct current at two hundred and twenty volts will be supplied by a generating plant to be installed in the ship. Leads from this generator will pass through the center pin and terminate in contact rings from which the current will be collected by sliding contact shoes.

Each of the main hoist blocks will handle a load of one hundred and twenty-five tons at a radius of one hundred and one feet and, when connected by the equalizer, the maximum load of two hundred and fifty tons at the same radius has a vertical range from forty feet below the deck to one hundred and three feet above the deck. The minimum radius of the main hoist, with the jib in its highest position, will be seventy-two feet.

The auxiliary hoist will have a capacity of forty tons with a maximum reach of one hundred and seventy-four feet horizontally. At a radius of one hundred and fourteen feet the vertical range will be from forty feet below to one hundred and thirty-five feet above the crane foundation. This hoist will operate at full load with the jib in any position.

It is interesting to note that the outer end of the jib, when in its highest position, is about one hundred and ninety feet above the water, and with the jib in its lowest position the extreme end is one hundred and two feet beyond the side of the ship.

Identical motors will be used for all operations of the crane. They will be of enclosed mill type, series wound and will have a rating of one hundred and ten horse power for one-half hour. Eight of these motors forming the power equipment of the crane, will be distributed; one to each of the main hoists, one to the auxiliary hoist, one to the auxiliary trolley, two to the rotating, and two to the luffing mechanisms. An electrically operated disk brake will be applied to each motor, so arranged as to set when the current is cut off. Flexible couplings will be used to connect the motors to their pinions.—*The Tech Engineering News*, June, 1922.

REVIEW OF BRITISH NAVAL ENGINEERING.—The fifteen years under review constitute an important landmark in naval engineering from more than one aspect. The steam turbine had, in 1906, with the completion of H. M.S. *Dreadnaught*, established itself as a reliable prime mover for the largest warships, and in the adaptability of this type of engine to develop large powers a new era had developed. The naval engineers were very proud of the large powers of 15,000 i.h.p. per shaft obtained in the cruisers of the *Good Hope* class with reciprocating engines, but experience with such large engines had only too plainly indicated that this type of steam engine was approaching the possible limits in size and power that could be relied upon to give uniformly satisfactory results from all points of view. The steam turbine opened up a new field, and rapid advances began at once to be made.

Already, in 1907, warship machinery of 41,000 s.h.p. were under construction, and in 1909 the design of the *Lion* class of battle cruisers, the machinery of which developed over 70,000 s.h.p., was put in hand. This increase of more than 100 per cent (compared with the highest powers on service prior to 1907) in the total power installed in one vessel in a

period of a few years is noteworthy. It was hardly foreseen at the time of their construction that these vessels would form the striking arm of the grand fleet some years later, commencing in 1914, and the fact that these vessels performed brilliant service in this capacity and proved themselves superior in speed and maintenance of power as compared with vessels of a similar class, of later date and under more adverse conditions, shows that the difficulties attending the installation of such large powers had been accurately foreseen and overcome.

Concurrently with the design of larger relative powers in other classes of ships, active development had proceeded in the navy in the use of oil fuel. The practical difficulties attending the satisfactory burning and application of this fuel have been overcome by the zeal and ability of naval engineers. The actual application to vessels on a large scale was, however, in 1907 and for some years, limited owing to the dependence of this country on overseas supplies. This problem of course still remains. It undoubtedly gave a deal of anxiety during the war, but measures had been taken to cope with the exigencies of such a situation as far as could possibly be foreseen. With the coal-burning installations it was very early realized that the large powers possible with the turbine were tending to be restricted in warships by the large weight and space in the ships necessitated by boilers in which coal was the principal fuel. The purely oil-fired boilers were therefore fitted for some years in torpedo-boat destroyer craft only, as in these vessels considerations of high power with minimum of weight and space occupied, were of the greatest importance. The experience in this class of vessel, commencing with the *Tribal* type which began their trials in 1907, was however sufficient to establish definitely the enormous superiorities of this type of fuel for other classes and, but for the supply difficulty, it is certain that we should not have waited till 1912 before its application to capital ships. In this year the battleships of the *Queen Elizabeth* class were designed in which this fuel alone is used. The power in these ships is 75,000 s.h.p., as compared with 23,000 in the *Dreadnaught* designed some seven years earlier. It must not be overlooked, however, that general developments had permitted the design of the large battle cruiser *Tiger*, with oil still as an auxiliary fuel, and in which 108,000 h.p. was developed. This vessel, with the exception of the 70,000 h.p. cruisers of the *Hawkins* class, was the last of the high-speed warships to be fitted for coal-burning and the whole of the battleships, battle cruisers, light cruisers and torpedo-boat destroyers in the post war fleet are oil-driven, with the exception of the cruisers referred to, and in which for special reasons coal-burning generators in one boiler room were retained. In the design stage of the most modern battleships in commission, viz., the *Royal Soverign* class, coal and oil were both arranged for, but this was changed before construction had advanced.

In 1910, Sir Charles Parsons, who had been experimenting for some years to solve the problem of the adaption of the high-speed turbines for low-speed ships, fitted the first set of mechanical reduction gearing in the cargo steamer *Vespasian*, and those in control of the engineering policy of the navy at once saw the possibilities of such reduction gearing, even for high-speed ships, and, taking a very bold step which, as events showed, was fully justified, very early adapted it for powers up to 11,000 h.p. per shaft in torpedo-boat destroyers, and up to 20,000 s.h.p. per shaft in light cruisers.

During the period of the great war those at the head of the engineering department of the fleet had necessarily to cope with a situation of great difficulty, and often under unfavorable conditions. With the large war programs developed, accompanied as they were by acute questions in relation to *personnel*, shortage of supplies and the maintenance of the

sea-going fleets in efficient condition, the greatest courage, resourcefulness and ability, coupled with ripe experience and mature judgment had necessarily to be exercised. This period was one of unexampled strain, and the fact that the machinery of the vessels of the navy, which was subjected to wear and tear far exceeding anything ever anticipated, come successfully through this period, says much for the work of the officers, upon whom devolved the higher technical responsibilities. Mechanical gearing, which had hardly passed the experimental stage, became a necessity if best possible results were to be obtained in the circumstances, but again the foresight given to its application enabled it to be developed for powers not thought possible at the time, and as a culmination it was eventually applied up to 36,000 s.h.p. per shaft in the battle cruiser *Hood* and three other vessels, which latter, however, were not completed. The power in the large destroyers of the flotilla leader type rose to a total of 44,000 s.h.p. with this type of machinery.

Quite apart from a genearl increase in powers and the problems of building on a large scale, the period called for the design of novel types of vessels, which in many cases presented special engineering difficulties. As a particular case, may be cited the large and fast steam submarines of the *K* class. During this period the application of the heavy oil internal-combustion engine for much higher powers than had previously been contemplated, called for serious consideration, and although presenting great difficulties for naval work owing to the weight of these engines, progress has been made, and is still being made, in certain directions in their application other than in submarines. That this engine has never been seriously neglected by the navy as some critics may at times imply, is made evident in Sir George Goodwin's paper in the development of Diesel engines for naval purposes, recently read before the Institution of Shipbuilders and Engineers of Scotland, and which we printed in full in a recent issue (page 535 ante). The light speed internal-combustion engine has also been successfully adapted for naval use in the vessels of the coastal motor-boat type.

In one direction we have seen the adoption for large powers of the turbo-electric system of propulsion in the large vessels of the United States navy, the merits of which have to be seriously considered in this country. The internal-combustion engine makes rapid strides in the commercial world, and presents an ever more interesting problem as regards its adaptability for warships which only energetic experiment and research will solve. The possibilities of developing the internal-combustion turbine have also to be borne in mind. Under previous *regime* and during the war, it was made apparent that the navy had its own special difficulties to solve, and the admiralty engineering laboratory was established in 1917, and is still an active concern in which new developments mainly in connection with the high-speed internal-combustion engines are being tested.—*Engineering*, 19 May, 1922.

DOUBLE-ACTING DIESEL ENGINE.—The North British Diesel Engine Works is experimenting with a double-acting Diesel engine which represents a novel departure from normal practice. The engine has a sliding cylinder in which the double-ended piston moves. The motion of the cylinder is obtained from a crank driven from a lay shaft and the cooling of the cylinder jacket is effected by means of flexible pipes.

There are two sets of exhaust ports placed centrally with scavenging ports at the top and bottom of the moving cylinders. Periodically during the reciprocating motion of the cylinder, the scavenging ports register with the manifold which is connected to the scavenging air supply. In this way scaveng valves are eliminated and the exhaust valves are similarly dispensed with.—*The Nautical Gazette*, 15 July, 1922.

FOETTINGER HYDRAULIC TRANSFORMERS ON "EMPRESS OF AUSTRALIA."—The first large ocean-going liner to be fitted with Foettinger transformers is the Canadian Pacific steamer *Empress of Australia*. While the transformers of this type already in service are not as efficient as toothed gearing, they possess certain compensating advantages such as their small size, small weight and comparatively large astern power. Engineers will therefore watch the new liner's performance with interest.

The vessel's propelling machinery is divided into two units, each consisting of a high speed turbine driving a Foettinger hydraulic transformer, which transmits the power developed by the turbine to the propeller shaft at a reduced speed. Each turbine has a rating of 7,250 s.h.p. with a speed of 800 r.p.m. The propeller shaft turns at a speed of 160 r.p.m. which corresponds to a reduction of 5:1.

According to *The Engineer* the transformer performs its maneuvering functions as follows: The transformer consists essentially of an ahead and an astern circuit, each of which is furnished with a primary wheel, guide blade and a secondary wheel. As the direction of the ship varies, one of the other of these circuits is filled with water by the transformer pump, the water outlet and inlet being contracted by piston valves operated by a steam reversing engine.—*The Nautical Gazette*, 29 July, 1922.

EXTINGUISHING ELECTRICAL FIRES.—Carbon-tetrachloride, either in the commercial form or the material known under the trade name of pyrene, has been used to a considerable extent by power-plant operators for extinguishing electrical fires. This type of extinguisher is the only one known that does not involve serious hazards of shock to the operator who might attempt to use it on electrical fire. Undoubtedly, the recent newspaper reports that a large number of passengers had been overcome in the New York subway by gas generated from carbon-tetrachloride used to put out a fire resulting from a short-circuit in a switchbox caused many power-plant operators to wonder as to the real danger of using this material as a fire-extinguishing medium.

A subsequent report by General Lincoln C. Andrews, chief executive officer of the transit commission, recommends the continuance of the use of pyrene extinguishers in the subways of New York City. The report points out that "There is no evidence that poisonous gas was generated through the application of carbon-tetrachloride. Smoke and fumes generated by the fire resulted principally from burning insulation, paint and other substances. The vapor and fumes from the carbon-tetrachloride were so diluted because of ventilation or drafts about the fire as to be negligible. A thorough search for a suitable substitute for carbon-tetrachloride as a fire extinguisher in similar circumstances has yet disclosed none as good or better."—*Power*, 1 August, 1922.

FOAMITE FIREFOAM PROTECTION FOR THE S/S "LEVIATHAN."—The contract for the fire entinguishing equipment for the *Leviathan* has been awarded to Chas. Cory & Son, Inc.

This installation contemplates the complete protection of the boiler compartments, fuel oil pump rooms and filling stations of this vast ship which is now being reconditioned for the U. S. Shipping Board by the Newport News Shipbuilding and Dry Dock Company.

A most careful survey of all points where oil might collect in the bilges, on tank tops, floor plates and furnace fronts was made by the engineers and means of distributing the Firefoam provided.

In inaccessible pockets under the floor plates of the boiler rooms permanent distributors are fed from the Firefoam supply, and points above the fireroom floor are reached by conveniently located hose stations and hand extinguishers.

An all important feature of this system is, should a fire become so intense that manually operated apparatus could not be used, the Foamite is supplied to the fixed distributors and continues to flow over the burning oil even when every man is driven from the compartment by heat, smoke and nauseous gases arising from the fire. The chemicals forming the fire smothering foam are led from storage tanks and forced by pumps located at a remote point far from the fire risk, and the valves controlling the flow of chemicals are also operated by remote control out of reach of the fire.

The amount of foam which each distributor and hose station will discharge in a given time is accurately known by long experience in this special line of work, and storage capacity of the chemicals forming the Firefoam is provided to cover the entire exposed surface to be protected to a depth of twelve inches.

This effectively smothers any fire as the foam flows over the burning oil and also prevents reignition, which latter is of vast importance.

When the fire is completely extinguished the Foamite Firefoam is readily washed down by a water jet and no damage is done to the parts exposed.

The usual plant consists of two tanks of equal capacity, one containing a solution of bicarbonate of soda and a special foam producing element known as *Foamite*. The other tank is filled with aluminum sulphate. This latter material attacks iron or steel, and this tank is therefore lined with lead.

Leading from each tank is a pipe. These pipes are run separately to the point where the solutions are designed to discharge either into the patented fixed distributors or to Siamese connections into hose lines.

The pipe carrying the sulphate of aluminum, and all its valves, fittings and connections, are specially lead lined. The other line and its fittings are of iron or steel.

The two fluids come together in the mixing chambers, or distributors, and a chemical reaction produces carbonic acid gas, which as it is formed, is held in bubble form by the *Foamite* and the resultant foam, which is eight times the volume of the two fluids, is of such a nature that the fiercest fire will not break down the structure of the bubbles, and it flows over the burning surface completely excluding the air and smothering the flame, thus reducing its temperature until combustion is impossible.

—Contributed.

AERONAUTICS

NAVY TESTS OF TORPEDO PLANES.—Daily test flights with various types of torpedo planes which embody the most advanced ideas of foreign and American builders, are being held under the direction of the foremost authorities on naval aircraft design at the naval air station, Anacostia, D. C., and the next few weeks should give to naval aviation the best torpedo planes in the world.

A. H. G. Fokker, designer and builder of the famous Fokker monoplane used by Germany during the World War for pursuit and combat work is now at Anacostia. He is directing the tests of his own plane, which is an adaptation of the German Fokker pursuit machine. In competition with the Fokker planes are types of British and American design, and with the rigid tests under way each type is being judged on its merits.

With the completion of present tests, maneuvers with the fleet will be conducted which will accurately represent conditions in naval battles of the future, when torpedoes launched from aircraft at a battlefleet will be perhaps the most formidable attack to be met or rather avoided if possible.

The present torpedo plane development by naval aviation in this country is the result of hearings by the general board of the navy conducted

along comprehensive and exhaustive lines to determine the vital requirements for torpedo work from aircraft. When opinions of leaders in naval aviation had been heard and digested, and the bureaus of ordnance, construction and repair, and engineering had been consulted, specifications embodying the characteristics of the best torpedo plane to meet all requirements of service were drawn up and contracts with five aircraft manufacturing concerns were drafted and signed. It was understood the British air ministry had in use a satisfactory type of torpedo plane, the Blackburn *Swift*, and the manufacture of one of these planes was contracted for. Mr. Fokker was called into consultation and asked to embody the specifications for a torpedo plane in the existing design of his combat plane, and three American manufacturers worked simultaneously on the problem.

The Curtiss Aeroplane and Motor Corp. constructed a plane known as the *CT*—a biplane having twin 400 hp. engines. The *CT* has recently been subjected to trials and tests at Rockaway, L. I., and will not be tested further for the present at Anacostia. The Stout Engine Laboratories of Detroit constructed an unbraced monoplane having a wing structure of duralumin metal sheeting and twin 300 hp. Packard engines. The Davis Douglas Co. of Los Angeles developed a biplane, types *DT*, having a single Liberty engine. The Davis Douglas plane had a series of successful trials at the naval air station, San Diego, Cal., before the trials now in progress at Anacostia.

The Fokker is a large monoplane and carries a single Liberty engine. Before its arrival in this country for the competitive tests the Fokker was flown in test flights before Lieutenant Commander N. H. White, U. S. N., in Amsterdam.

The British plane was also subjected to trials before being brought to this country. These trials were conducted by the manufacturers in the presence of the American naval attaché in London.

The foregoing illustrates the care that was taken to insure an assembly of the very best types of aircraft in the world suitable to torpedo work. Aid of the foremost international talent was first enlisted, and by elimination, five types of torpedo planes secured. Finally the rigid competitive tests at Anacostia were inaugurated.—*Aviation*, 24 July, 1922.

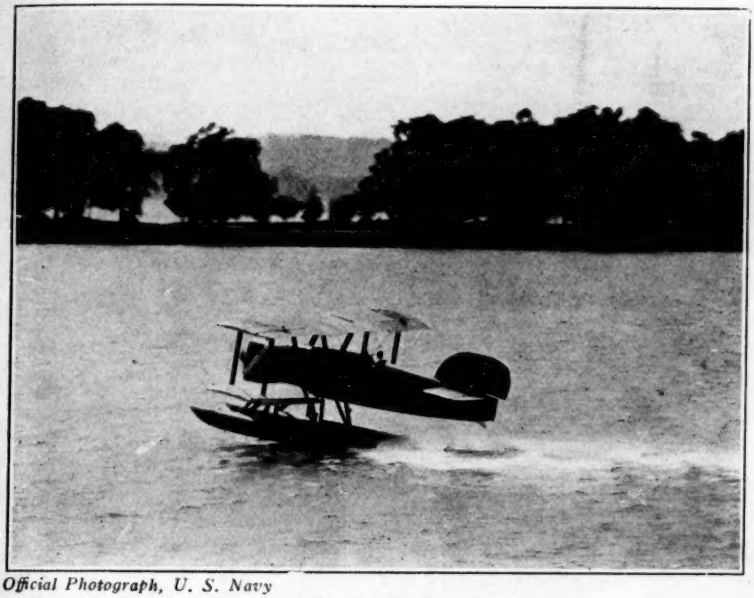
NEW COMBAT PLANES DESIGNED FOR NAVY.—Washington, July 22.—A new type of seaplane, called the "*TS*" and designed to meet the requirements of combat and pursuit in connection with fleet operations, has been designed and developed by the naval bureau of aeronautics and is undergoing tests at the Anacostia naval air station. Naval experts said today that the new type had characteristics for combat work equal to those of any combat plane in use by military service and is, besides, adaptable to ship use.

The seaplane was built at the naval aircraft factory in Philadelphia. Another machine of the same type has been completed by the Curtiss Company and will soon be tested at Anacostia.

The function of the combat plane is to protect aircraft by destroying or dispersing enemy aircraft. Great radius of action, small dimensions, speed, adaptation for handling or stowage on shipboard, superior manevrability and stability, along with light but rugged construction, are the qualities sought.

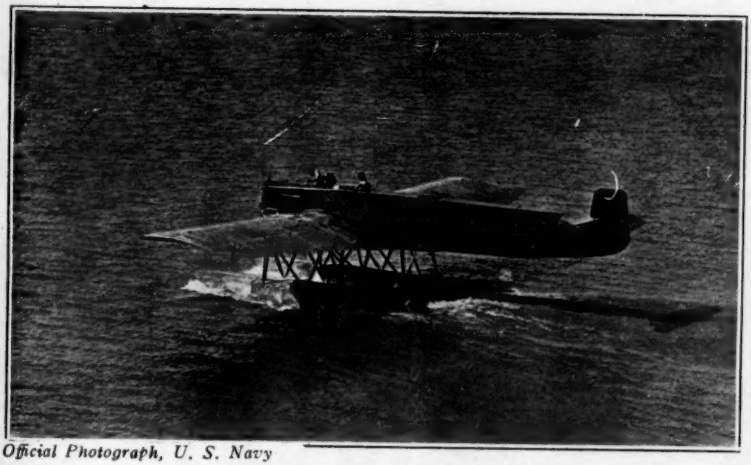
In the tests at Anacostia the *TS* showed all these qualities in a manner extremely satisfactory to government experts who say it is the equal of any craft of its kind in standard use.

The seaplane is equipped with a Lawrence 200 horsepower air-cooled motor. Speedy assembling and disassembling of the craft is possible. The struts, connecting the upper and lower wings are secured by pins, which



Official Photograph, U. S. Navy

DOUGLAS DAVIS TORPEDO PLANE



Official Photograph, U. S. Navy

FOKKER TORPEDO PLANE

are easily withdrawn, so that the plane can be disassembled quickly and carried in small space. Two types of landing gear are provided—wheels for landing on ship's deck or land and pontoons for landing on the water. —*New York Times*, 23 July, 1922.

F5L's IN LONG SQUADRON CRUISE.—The safe arrival of twelve *F5L* seaplanes which flew from Philadelphia, Pa., to Pensacola, Fla., has just been reported to the bureau of aeronautics of the Navy Department by the naval air station at Pensacola.

This flight of twelve large scout planes over a distance of approximately 1,000 miles without mishap of any kind is a high tribute to the efficiency and reliability of material and personnel and demonstrates conclusively the mobile qualities of naval aviation units.—*Aviation*, 17 July, 1922.

BUILDING BIG HELIUM AIRSHIP.—The first large-sized semi-rigid airship of all-American design is now being constructed at Akron, Ohio. This will also be the first American floating aerial base and airplane-carrier. This ship will be used experimentally to develop the lighter-than-air machine as a fuel-saving, long-distance carrier and mother ship to airplanes that will take off from and attach themselves to it in the air, according to Major P. E. Van Nostrand, in charge of the balloon section, United States army air service here.

The new craft will have a capacity of from 70,000 to 750,000 cubic feet of gas and will be something less than 400 feet long and will be propelled by four 12-cylinder Liberty motors able to drive the airship at the rate of 70 miles an hour. It will be able to carry two or three airplanes, but experiments will be begun with the use of one plane of small type which will be carried underneath the ship and launched from that position. By merely throttling down the speed of the plane, it will be able to fly underneath and hook on to the mother ship. Airships large enough to carry from five to fifty planes may be developed as a result of these experiments.

"Leaving and returning during flight is a simple matter," Major Van Nostrand claims. "As long as the airplane stays in its natural element there is little chance of trouble. It will furnish a safer method than that of the hydroplane lighting on rolling ships around which there are frequently treacherous air currents and will be much superior to present ground landings.

The new airship is especially designed for helium gas which has about eight per cent less lifting power than flammable hydrogen heretofore used. On account of this the bag must have a larger capacity to raise the same amount of dead weight. Helium gas is also too scarce and valuable to be released to regulate the altitude of the craft. In the ordinary hydrogen balloon and airship when it is desired to go higher ballast is thrown out and when necessary to descend gas is let out. In the new helium aircraft, the necessity of valving or throwing out ballast is partly compensated for by cooling or heating the helium and thus causing it to contract or expand as desired.

Using the gasoline fuel during a long trip would ordinarily lighten the ship and cause it to rise. But loss of weight in fuel is compensated for by collecting the water in the exhaust gases formed by the hydrogen in the gasoline combining with the oxygen of the air in the engines. For one hundred pounds of gasoline used there is about one hundred pounds of water produced and the weight approximately equalized.—*Boston Evening Transcript*, 17 July, 1922.

LANDING PLATFORMS PERFECTED FOR NAVY PLANES.—On July 19 the Navy Department announced the perfection of a landing device whereby

speeding planes are brought to stop on a wooden platform, 100x10 feet. The method of effecting a landing within the confined limits of the wooden platform is described as one of the most expert performances that the flying art has achieved. The plane, sweeping low and traveling at the speed of the fastest express train, is landed by the pilot close to the edge of the platform, whereupon a hook suspended from the bottom of the plane engages the transverse wires on the deck. The successive wires are picked up and the increasing amount of weight attached to the wires exerts a brake effect on the speed of the plane, which thereby is brought to rest within a distance measured in feet.—*Army and Navy Journal*, 22 July, 1922.

NEW WRIGHT ENGINES FOR NAVAL AVIATION.—The Navy Department has in a quiet way done a considerable amount of development work on aircraft engines during the past two years. An interesting evidence of this is the recent completion of test of 250 hr. on a Wright E2 engine. This engine was run for two periods of 125 hr. each. One hundred and twenty-five hour runs were continuous, 24 hr. a day, the only stops being three in each period due to gasoline shut off, trouble with oil radiator leakage, spark plug renewal and the necessity for club renewal, as part of the test was conducted in a rainy period.

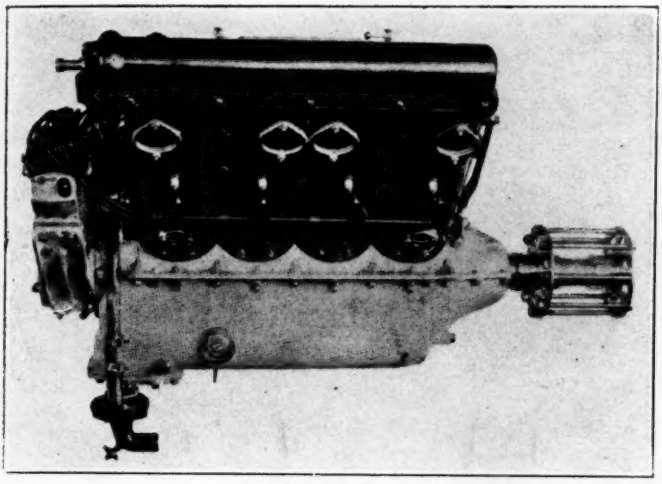
This engine was run at a rated horsepower of 180, and a rated speed of 1,800 r.p.m. on straight aviation gasoline. While the results of the test are not for publication as yet, it is understood that the Navy Department is well pleased with the tremendous durability shown by the engine and it is also understood that the Wright Company intends to incorporate in future production engines several modifications of the standard E2 which were tried out during this test.

Another result of the encouragement by the naval bureau of aeronautics of independent development of aircraft engines is the development by the Wright Aeronautical Corp. of a new 12-cylinder engine, known as Model T2. This engine was designed to meet the Navy Department requirements, and has been built on Navy Department orders. It is designed for heavy-duty naval seaplanes, whose long flights require great durability, and on account of the weight of gasoline necessary, the engine had to be as economical as possible. Notwithstanding these primary considerations, this engine, as developed, seems to have a wide range of application, owing to its low weight per horsepower.—*Aviation*, 31 July, 1922.

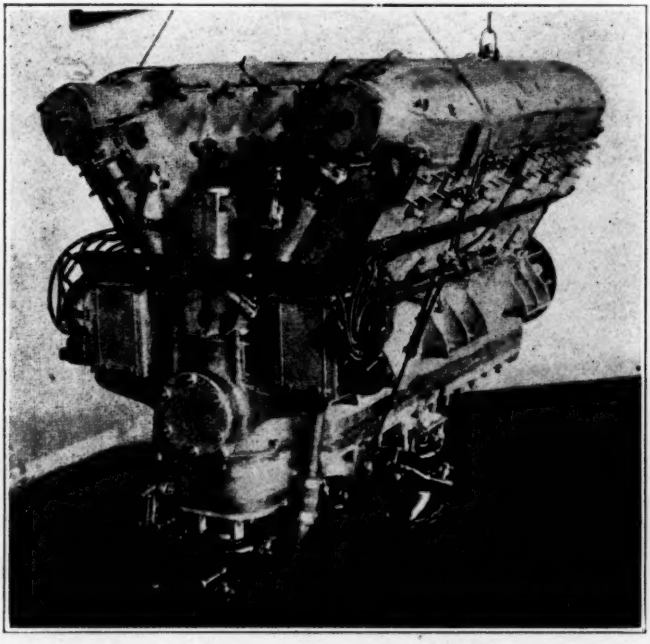
BRITISH AIRCRAFT IN FLEET EXERCISES.—Mr. Amery (to Captain Viscount Curzon): Aircraft have taken part in various exercises carried out by the fleet this year, whenever the weather has permitted of them doing so. Their work has consisted mainly of reconnaissance, the exercise of torpedo plane attacks and spotting. In addition a certain amount of experimental work has been carried out.

NUMBERS OF BRITISH NAVAL AIRCRAFT.—Mr. Amery (to Captain Viscount Curzon): The aircraft (apart from reserves) allotted for working with the fleet from ships and carriers are as follows:—18 reconnaissance planes, 6 fighters, 12 torpedo planes, 18 spotting planes. The personnel available is sufficient to man these aircraft.—*Army, Navy, and Air Force Gazette*, 22 July, 1922.

ROYAL AIR PAGEANT.—The R. A. F. aerial pageant, which was held successfully at Hendon on Saturday last, was of special interest, not alone on account of the spectacular display, but also because four new types of machines designed for naval and military purposes were shown for the first time. These machines included two of the very latest craft for naval



WRIGHT MODEL E2 180 H.P. ENGINE WHICH RECENTLY MADE A 250 HR. TEST RUN FOR THE NAVY DEPARTMENT



WRIGHT MODEL T2 500 H.P. ENGINE BUILT FOR HEAVY DUTY NAVAL SEAPLANES TO THE ORDER OF THE NAVY DEPARTMENT

service, a third was a special high-power single-engined plane for long-range bombing duties over land, and the fourth a fast aeroplane for fighting and army reconnaissance. The Blackburn *Dart* torpedo carrier is specially designed for carrying out torpedo attacks on warships, the torpedo being accommodated beneath the fuselage, which is of special shape, giving the pilot a wide range of vision over the sea. The second naval type is the *Seagull*, an amphibian of the flying-boat type, with wheels which may be raised and lowered by the pilot. The ability of this machine to alight either on land or water forms a valuable asset for naval reconnaissance duties. The new *Aldershot* aeroplane, the long-range bombing machine, has a double deck, the two decks being connected by a ladder on the interior of the fuselage.—*The Engineer*, 30 June, 1922.

TORPEDOES FROM THE AIR.—The Blackburn *Dart*, the new torpedo-carrier aeroplane, may quite possibly revolutionize naval warfare, writes a correspondent. At a recent trial off the Isle of Wight, in which three *Darts* took part, they each registered a hit. The whole point about the *Dart* attack, I was told by an expert, is the tremendous speed with which it is carried out. The Isle of Wight attack lasted less than one minute, but in that time the deadly work was accomplished. Each *Dart* carries one torpedo weighing about 1,400 pounds, and in action they work under the protection of armed scouts.

The method of attack is quite simple. The *Dart* descends and fires the torpedo when about ten feet from the water. The torpedo travels in the direction in which the plane is travelling, so that the aim may be said to be taken by the pilot. If necessary, the *Dart* can be landed in the sea, but it is not very well adapted for that. The folding wings enable it to be easily carried on the aircraft carriers of warships. The *Dart* can, when necessary, travel at less than 30 miles per hour. This ability to fly slowly will prove invaluable in action.—*The Naval and Military Record*, 28 June, 1922.

NAVIGATION AND RADIO

NEW SOUNDING DEVICE.—The destroyer *Stewart* has just finished a cruise from Newport to Gibraltar, during which a new sounding device which can be used in both deep and shallow water was given a service test. This apparatus was designed principally by Harvey C. Hayes, physicist of the naval engineering experiment station, Annapolis. Dr. Hayes made the cruise to Gibraltar aboard the *Stewart*.

The *Stewart* is the first vessel to be equipped so that a continual line of soundings can be run throughout a cruise. During her cruise to Gibraltar exhaustive tests of the sounding service were carried on and daily reports were made by radio to the Navy Department at Washington.

The radio reports show that during the whole of the cruise the apparatus worked without apparent error. The machine secured correct and rapid soundings with ease. The *Stewart* made the cruise from Newport to Gibraltar in nine days, and during this time over nine hundred soundings were taken at frequencies varying between 20 and 2 minutes. The ship's movements, while steaming steadily at 15 knots, were not interfered with except for a two-hour interval. During this two-hour period it was shown that successful soundings can be taken at intervals of one minute in the deepest water. The outline of the bottom of the sea over the course was minutely recorded between Josephine and Tysburg Bank. The sea bottom there was found to consist of an extensive plane bordered by mountain and tablelands, some of which rose 4,000 feet above the plane. Several deep depressions, none of which are shown on charts, were also discovered. Positive depth data was secured where charts show only negative data in the vicinity of the Azore Islands.

It is believed the outline of the trade routes should give any number of such landmarks for use in finding a ship's position. The exploration of all the sea floor is possible by the use of this new device, which bids fair to revolutionize piloting and navigation.

The new sounding device gives immediate measurements of depths of water so that there is no lead to heave or wire to unreel and reel in again as in other means of obtaining soundings. It is used in connection with a sound transmitter and sound receiver and depends in its operation upon the reflected echo of a signal given off by the vessel's sound transmitter being received by the same vessel's receiver.

The sound transmitter used in connection with Dr. Hayes' sounding device develops a high frequency vibration in a diaphragm which is in contact with sea water. The high pitched note carries a great many miles. The sound receiver is capable of receiving sound transmitter signals over great distances. The value of this receiving apparatus in locating light vessels and buoys equipped with sound transmitters is already known to the maritime world, though it has never before been used in connection with sounding the bottom of the sea.—*Army and Navy Register*, 15 July, 1922.

A NEW TELEPHONE INVENTION.—A demonstration was given recently in the office of the chief signal officer of the United State Army of a new telephone invention, the "Superphone," which has been developed under the direction of R. D. Duncan, Jr., chief engineer of the signal corps research laboratory, at the bureau of standards, assisted by S. Isler, assistant radio engineer.

The new device is based on the original invention, about 10 years ago, by Major General O. Squier, chief signal officer of the army of "wired wireless" or "line radio." It consists of a small portable set of instruments which may be installed in any office or residence in a few minutes and connected directly to existing telephone lines, and conversations carried on in the usual way. It will be necessary only for the subscribers to close a switch or press a button to connect in the superphone in place of the ordinary phone.

This superphone provides a means for secrecy of communication without any chance of the conversation being overheard, interrupted or broken into on the line by any one else. It is obvious that this invention will prove of value for military purposes in case of war, where secrecy in communication is absolutely necessary. It may also prove of utility for ordinary commercial purposes where important business houses, such as banks, brokers, etc., may desire to have private channels for confidential communication with their branch officers or with any business establishment, and insure secrecy of the conversations carried on.

The principles involved in this invention are those of "wired wireless" by which high-frequency alternating currents are employed which are modulated at the transmitting end by speaking into an ordinary microphone and detected at the other end by the usual radio instrumentalities which finally pass on to an ordinary telephone receiver. The speaker, however, or the listener-in, is not concerned with any of the additional instruments; they are installed and properly adjusted once for all, and the people carrying on the conversation have no more bother than in the use of the usual telephone system.

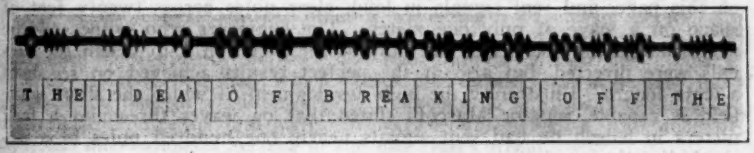
Another advantage of this method of telephone communication is that it makes multiplex telephony possible. A number of secret telephone conversations may be carried on simultaneously over the same line without interfering with each other.

The transmission of speech by the utilization of this invention is even clearer than ordinary telephonic speech.

The power required for carrying on conversations over even considerable distances is of the order of one-tenth of a watt, which is about 1/500th of the power required to light an ordinary electric lamp.—*Scientific American*, June, 1922.

RECEIVING RADIO AT 200 WORDS PER MINUTE.—The capacity of radio telegraph stations is to be increased to a considerable extent in the near future by the use of rapid methods for receiving the messages. The efforts in this direction which have been made by one of the largest French radio companies are now meeting with great success. This firm has been very active in the construction of wireless stations, one of the most recent being the great station of La Doua, at Lyons, which is now working with the United States. This station has already been described in our columns, so that we will confine our present efforts to a brief account of the methods and apparatus which are employed for recording the messages at high speeds.

The phonograph method is employed for taking down messages at speeds which are considerably above the usual rates, this speed being in all cases above 25 words per minute and may reach as high as 100 to 150 words. But it is evident that messages with the dot and dash system cannot be read at such high speeds on the telephone by the operators of the station. The phonograph can, however, be called upon to take down the messages at these rates, and by means of the new apparatus the signals are now recorded upon the phonograph without difficulty. A phonograph of the customary disk type is employed for this purpose, making necessary certain slight changes in the equipment, such as are required to adapt it to radio service, all that is necessary being to mount the receiving telephone in the place of the usual phonograph recording diaphragm, the telephone diaphragm being provided with a stylus for producing the record on the disk.



PIECE OF PHOTOGRAPHIC RECORDER TAPE CONTAINING PART OF A MESSAGE RECEIVED AT THE RATE OF 200 WORDS PER MINUTE, WITH THE TRANSCRIBED MESSAGE BELOW EACH DOT-DASH CHARACTER

It is found that the phonograph record is still quite satisfactory when the apparatus is working at 150 words per minute. When the disk has received the telegraph message, it is transferred to a second device which serves to reproduce the sounds in the usual manner, but the record type of phonograph is of a somewhat different design, and is designed to operate at slower speed in order to enable the operator to read the messages.

A still higher speed for recording wireless messages can be reached by making use of the photographic method, and by the use of improved apparatus recently brought out by the French firm it is possible to operate at speeds which can handle up to 500 words per minute. This makes it a more rapid means for receiving messages than the phonograph system, and the new photographic apparatus is not of an unduly complicated nature. Indeed, it is so designed that all the operations can be carried out in a very simple manner and by persons having no very special skill.

The photographic recorder is based on the use of a galvanometer containing a small mirror which is adapted to swing under the action of the radio impulses forming the signals, the current at the receiving end being amplified to the proper degree by the use of the usual amplifying devices. The duration and amount of the swing of the mirror will correspond to the dot and dash signals, while the mirror reflects a beam of light onto a strip of sensitive paper tape which is caused to unroll at a greater or less speed, according to circumstances. The beam of light thus traces the message on the strip. The result is that the message will appear in the form of dots and dashes, as shown in one of our illustrations, when the strip is developed by the usual photographic process. No difficulty is experienced in taking down messages at the rate of 500 words per minute. It should be remarked that such messages could not be read by a station which is not provided with the photographic receiving devices.—*Scientific American*, June, 1922.

SENATOR MARCONI'S SHORT WAVE EXPERIMENTS.—Experiments in the application of the short wave have resulted in the discovery of a new field in the science of wireless communication which when further developed will increase the safety of life and property at sea. The innovation, which was explained and demonstrated by Senator Guglielmo Marconi before the American Institute of Radio Engineers and the American Institute of Electrical Engineers, is based upon the ability to aim a wave in any chosen direction and send it straight to the receiving station for which it is intended. The unlimited possibilities of this new phase of the radio art are very apparent and it does not require too keen a prophetic vision to foresee that the discovery presages a new wireless era and that its universal application is not far off.

For his demonstration before the radio and electrical engineers Senator Marconi used a miniature wireless set, a photograph of which is shown on this page, and sent signals in loud, clear notes across twenty feet of space on a wave of only one meter. The engineers who witnessed the performance were surprised not only at the precision with which the signals were directed, but also at the perfect results achieved on so short a wave length. Illustrating the high development of which the short wave field is capable Senator Marconi stated that on waves three and a half meters in length he had sent signals nearly one hundred miles in a desired direction.

* * * * * * * *

These results were achieved by the use of a reflector apparatus for the sending of the wave which is caught at the receiving end on a horizontal metal standard. This reflector is semi-circular in shape and is covered with wires. When its open side is turned toward the receiving station the signals are strong and clear, but when turned away the signals become almost inaudible.

* * * * * * * *

"The attenuation of these short waves over sea is so surprisingly regular that a little experience enables distance to be judged by the strength of signals, and this can be measured by means of a potentiometer."

Senator Marconi said that he believed the same system could be applied to ships at sea, so that collisions would be avoided in thick weather, and it would be unncessary to send out the famous S O S call for help.

"It seems to me," he declared, "that it should be possible to design apparatus by means of which a ship could radiate or project a divergent beam of these rays in any desired direction, which rays, if coming across a metallic object, such as another steamer or ship, would be reflected

back to a receiver screened from the local transmitter on the sending ship, and thereby immediately reveal the presence and bearing of the other ship in fog or thick weather."

Trials are now being carried out by Mr. C. S. Franklin of the British Marconi Company. Describing the apparatus and its working Senator Marconi said: "The transmitter and reflector, revolving, act as a kind of wireless lighthouse or beacon, and, by means of the revolving beam of electrical radiation, it is possible for ships, when within a certain distance, to ascertain, in thick weather, the bearing and position of the lighthouse. —*The Nautical Gazette*, 1 July, 1922.

MAJOR ARMSTRONG'S NEW SUPERREGENERATOR.—The exact nature of Major Edwin H. Armstrong's new work, about which there has been so many rumors, was revealed in a paper before the Institute of Radio Engineers. The new device described and exhibited by the inventor is named by him a superregenerative receiver.

In the *New York Tribune* Jack Binns gives an enthusiastic account of the new method. We read:

"Armstrong calls his latest system the superregenerative receiver, but it is in all reality the first true radio-frequency amplifier. Its most astounding characteristic is the fact that it increases its power of amplification inversely as the square of the wave-length. Put in simpler language this means that the lower the wave-length the greater the amplification; thus if the wave-length is cut in half the incoming signal is amplified four times stronger than it would be in the first case.

"Perhaps another more forceful way of stating this is by saying that the new receiver opens up to us the lower wave-length ranges, so that in the immediate future it will be quite possible for broadcasting stations to operate on wave-lengths as low as ten meters. Now when we have broadcasts as low as that it will mean that the two stations close together can broadcast simultaneously without interference, one using a wave-length of ten meters and the other a wave-length of eleven meters.

"This is because of the fact that at those wave-lengths there is a difference in frequency between the two stations of 2,727,000 cycles a second. As it is frequency which causes interference, it will be seen how great is the margin of difference in frequency on the low wave-lengths, when a difference of one meter in wave-length makes a difference of 2,727,000 alternations a second in the electrical current.

"The wondrous possibilities of the new apparatus are obtained in the simplest manner imaginable. The terrific amplification can be obtained with two ordinary vacuum tubes connected together with inductances and condensers, but, of course, better results are obtained with three tubes, as shown in the diagrams reproduced on the following page.

"In an actual demonstration of his new apparatus before the Institute of Radio Engineers, Armstrong completely flooded the large auditorium with music and speech from Newark, eighteen miles away, although he used only a small loop about one meter diameter. This was done despite the fact that the Engineering Societies Building is a mass of steel framework thoroughly grounded.

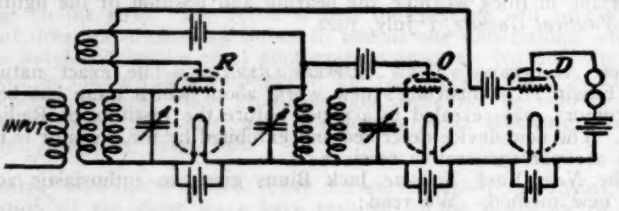
"Alongside of his demonstrating apparatus was a standard regenerative receiver with two stages of audio-frequency amplification. When this was attached to the loop aerial no one in the room could hear the music from Newark, although it could be heard faintly in the head telephones.

"One of the astounding characteristics which makes the new receiver the ideal broadcast apparatus, is its ability to completely eliminate spark signals. It wipes them out absolutely.

"In explaining this, Armstrong pointed out that the incoming spark sets up free oscillations in a regenerative circuit which continue until the

next spark comes along, and the greater part of the energy is in these free vibrations.

"In the new system these free vibrations are completely wiped out because every twenty-thousandth of a second the resistance of the circuit becomes positive and thus chops the free vibrations out before they have a chance to be built up.



From the New York "Tribune."

THE NEW ARMSTRONG SUPERREGENERATIVE CIRCUIT.

"The future possibilities of the new system are limitless. One of the most important of them is bound up in the ability of the apparatus to operate economically and efficiently upon short waves. It will be possible in the near future to utilize the receiver with the system now being developed of short-wave wireless telephony, using a reflected wave which will give the utmost degree of secrecy attainable.

"Although Armstrong has steadfastly refused to talk about any of the remarkable inventions, he did say to me yesterday during a conversation that he had succeeded in getting down to fifty-meter wave-lengths with the new system, and that this experiment had confirmed the fact that the apparatus amplified four times greater on the short waves.

"On waves of this length, using reflectors shooting a beam of waves in one direction, wireless telephone conversation has already been accomplished by Franklin in Europe over a distance of 200 miles with the older types of receivers. With Armstrong's latest receiver this distance could be greatly increased with the same amount of transmitting power.

"Despite the fact that Armstrong, who is naturally modest, is reticent about the value of his inventions, his friends have no hesitation about pointing out their value. In this connection Louis G. Paceni, a member of the institute and one of the co-workers, in discussing it with me, said:

"When we take into consideration the fact that the superregenerative system is 100,000 times more sensitive than the regenerative circuit, it is well to point out that the regenerative circuit itself is several hundred thousand times better than the ordinary circuit.

"Another important point is the fact that with a multi-stage radio-frequency amplifier it is very hard to change wave-lengths, but by using the superregenerative method the wave-length range can be very easily changed. Such a change does not require more than two adjustments, one in the secondary circuit, and the other on the feed-back or regeneration.

"With fixed inductances a wave-length range from 150 to 600 meters can be covered without difficulty or changing the inductances or capacities. In other words, you get a wave-length ratio of four to one; say, starting at 100 meters you would get 400 meters, and starting at 25 you would

get 100 meters. Of course, if the inductances are made adjustable the difference in the wave-length range can be greatly increased.

"It seems that Armstrong, in addition to giving the radio an invention which is capable of reception on short wave-lengths in a tremendously efficient manner heretofore unknown, has opened up a new field, using extreme frequencies and amplifying them without difficulty." *The Literary Digest*, 15 July, 1922.

MISCELLANEOUS

"DUNCAN" GOLD MEDAL ESSAY, 1921-22.—Deduce from the experience of war, the future of the defence of coast fortresses against attacks by land, sea, and air, during the next ten years. By Major and Battalion Lieutenant Colonel F. W. Barron, O.B.E., R.G.A.

"Si Vis Pacem, Para Bellum." In these days of financial stringency, when the cry for economy is upon the lips of every "man in the street," it is, perhaps, only to be expected that our coast fortresses should be a target for the axe of the economist; the more so, seeing that, during the whole course of the greatest war in the history of Great Britain, there is no single instance of a serious attack by the enemy of any of our great defended ports. The fact that the efficiency of the defences of those ports was, of itself, a reason for the absence of attacks, is either unknown to, or deliberately ignored by those who maintain that coast defences are nothing but a costly encumbrance. And yet these same people would hardly suggest that the Bank of England should be left unguarded, or rest confident in the protection to their houses afforded by locked doors and windows, and therefore vote for the abolition of the police. That coast defence will be necessary in the future as in the past is beyond doubt. Our problem in this paper is to consider the form which such defence must assume, and in what respects it will differ from the coast defence of pre-war days.

CHAPTER I

It is to be noted that the period of time to be covered in the forecast in this paper is to be one of ten years. Since the subject was selected, however, two important things have occurred:

(a) It has been decided by the government that a war against a civilized power may be treated as in the last degree improbable during the next ten years.

(b) At the Washington Conference we have definitely abandoned our position of maritime superiority, and have adopted a "one-power standard," which is to be maintained, again, for a period of ten years.

Consequently we are dealing with a period during which we regard war as improbable, and when, should the unexpected happen, we shall be relatively weaker than ever before, as regards our navy.

It is to be feared that the opponents of coast defence will be encouraged to even greater activity by the former factor, and will fail to observe that the existence of the latter only renders it more necessary than ever for us to ensure adequate defence for our more important naval bases and seaports.

Let us therefore consider for a moment what is the object of a coast fortress, i.e., the rôle it is intended to play in war.

It cannot be doubted that to the uninitiated, the word "fortress" only too often conveys the same meaning as the word "fort." It calls to mind an impregnable citadel such as Kronstadt, or a fortified island fastness such as Heligoland. The expression "coast fortress," however, covers an idea far more extensive than this. It is difficult, if not impossible, to

give an exact definition, but perhaps a suitable description would be: "A coast fortress is a locality containing works of defence for the purpose of repelling attack by either air, sea, or land, with the object of safeguarding some important military or civil establishments located within its perimeter." It will be seen that the definition covers every kind of defended locality, from the smallest coaling station up to an enormous area such as that of the Portsmouth defences, which includes the whole of the Isle of Wight. It will also be apparent that the definition will include not only those localities which exist as coast fortresses in time of peace, whose defences have been gradually developed, extended, or improved in conformity with the progress of scientific and mechanical knowledge, but also localities which may be converted into coast fortresses in time of war. (For examples of the latter we may point to Scapa Flow and Zeebrugge, which were converted into coast fortresses during the recent war, the former as the base for the British grand fleet and the latter as an advanced base for German submarines.)

As regards the rôle of the coast fortresses, it is merely stating a platitude to say that the only means to final success in war is to attack, and it may therefore be argued that to spend money on a purely defensive article is simply to divert that money from the more profitable purchase of instruments of offence. This is certainly true, within limits. But weapons of attack require renewal and repair, schemes of attack entail provision of food, ammunition, and a host of stores of all descriptions, and finally, the direction of attack calls for the provision of staffs, intelligence centers, and numerous establishments of personnel. And all these varying factors demand security as a condition of complete efficiency. The rôle of the coast fortress, therefore, is to provide that security for the direction of attack, and for the preparation, supply, and maintenance of the means thereto, both in personnel and material.

CHAPTER II

Pre-War Conditions

It has always been taken as an axiom that our naval forces would be able to assert superiority at sea over any combination of foreign navies which might be brought against us, and consequently that any movement of hostile fleets on a large scale would be dealt with by our navy within a short time of its commencement. In home waters this period was estimated to be not more than 48 hours. In foreign waters, however, it was clear that no estimate could be made, in view of the scattered nature of our oversea possessions.

From this followed three main conclusions:

(a) That an invasion of Great Britain by a large army with all its necessary impedimenta would certainly be impeded, if not actually prevented, by our navy, and that consequently a continuous line of defences round our coasts was not required.

(b) That it was possible, however, that individual ships or squadrons, detached from the enemy's main fleet, might be able to carry out attacks of the "tip and run" nature upon our ports, and that small raiding forces might be landed in undefended localities, and thence attack our fortresses from the land side.

(c) That immunity from attack upon our oversea ports could not be absolutely guaranteed by the navy.

It is obvious that to make our ports, home and foreign, entirely secure against attack, would have entailed the provision of local defences at each of them, and it is equally obvious that, since our resources, even in pre-war days, were not unlimited, such a course of action could not be adopted. The accepted policy, therefore, was to provide local defence for certain

areas which contained important and vulnerable objectives, and to accept the dangers incurred by leaving the less important places undefended. In order to determine the form which such defence should take, it was obviously necessary to consider the nature of attack which might be expected. In view of the probability that hostile forces attacking a defended port would almost certainly be themselves attacked by our naval forces within a few hours, it was decided that, except in a few special cases, it was unnecessary to provide for complete protection against prolonged operations. The important requirement was that the defences should be of such a nature as to act as a powerful deterrent to attack by hostile ships. At certain ports, especially many of those abroad, the minor importance of the port or the improbability of attack by heavy ships made the provision of the full scale of defence required for large fortresses unnecessary, and in other places the special probability of one or other form of attack called for modification in the means of defence. In fact, the defence of every locality had to be considered on its own merits, with due regard to the importance of the place, its distance from enemy bases, coastal and hydrographical features, etc.

Briefly, the principles on which our schemes of defence were compiled were:

(a) To keep bombarding ships at such a distance from the fortress, as to prevent serious damage to important targets lying within it.
(b) In case of home ports, to hold off an attacking enemy until our naval forces should have time to arrive and deal with him by fleet action.
(c) To prevent the entry of torpedo craft into harbors and roadsteads.
(d) To repel attempts at mine-sweeping or the removal of booms or other obstructions, and to prevent the blocking of narrow channels by enemy mine-layers or blockships.
(e) To resist attack from the land-side for a sufficient time to allow of the arrival of our own land forces.

CHAPTER III

Examples of Attack and Defence of Coast Fortresses During the Great War, and Lessons to be Learned Therefrom as to the Principles of Defence

Perhaps one of the most noticeable features of the war, in which sea-power played so great a part, and in which the navies of every one of the great naval powers took part, was the paucity of instances of attack on land defences or defended areas by warships. A few of the more noticeable are as follows:

(i) *The naval bombardment of the Dardanelles*

This consisted of a deliberate attack by battleships on permanent shore defences, with a view to destroying them so completely as to allow of the entry into the defended waters of craft charged with the duty of removing minefields and other obstacles, and thus to clear a passage into the Sea of Marmora for our fleet, military transports, and various auxiliary craft. The chief lesson to be learnt from this example is that, in a direct duel between ships and forts, the odds are distinctly in favor of the forts. One lucky shot from a ship can at best demolish one gun of a fort. On the other hand one lucky shot from a fort may quite easily neutralize at least half of the guns of a ship. And moreover, owing the difference in size of the target, and the advantage accruing from the possession of a fixed and stationary platform, the prospects of accuracy of the land gun are enormously greater than those of the ship's gun. Further, the ship's

gun, being designed primarily to engage other ships, and being required to pierce a considerable thickness of armor, is necessarily of very high velocity and therefore of flat trajectory, and employs a very different type of projectile from that which is the most suitable for the attack of land defences. The flat trajectory renders it ill-suited for engaging any but direct-fire targets, and considerations of space prevent the carrying of two classes of projectile.

(ii) *The bombardment of Madras, Whitby, Scarborough, and other open or lightly-defended coast towns*

These bombardments, which were all of the "tip and run" nature, only serve to teach us the impossibility of rendering our coasts completely immune from attack. In neither case was there any great military advantage to be secured by the enemy, and in neither case did he inflict on us any damage which could have a real effect on the war as a whole. And, in one or two cases at least, the incidents went to prove the wholesome dread felt by a surface ship of coming within range of even the smallest guns of a coast battery.

(iii) *The German torpedo-boat attack on Dover*

This attack was entirely half-hearted, and was not pressed home. This was perhaps chiefly because it was made without any very definite object, but was also, no doubt, partly on account of the readiness of the defenses.

(iv) *The blocking of Zeebrugge*

This operation was in every way a model. Its success practically crippled the German submarine compaign, not merely by the loss of the use of the vessels which were shut in, but by the denying to the enemy of his advanced submarine base. It was a triumph of organization and foresight. Every possibility had been considered, every development forecasted, every element of risk eliminated as far as possible. For these reasons it succeeded completely, where every similar attempt in previous history had been either a complete or partial failure.

The operation consisted of several features: long-range bombardment of the heavy guns of the defense, short-range bombardment of the light guns, a raid on the land defences by landing-parties, attack on the boom and net defences by small craft, and finally the sinking of three large vessels in the narrow entrance of the canal, inside which was the submarine anchorage.

The chief lesson to be learned by the defence from this attack is, we think, the necessity for a high standard of training in the personnel. Two points seem to emerge from the reports to the action above all others, namely:

(a) The diversion created by the appearance of the *Vindictive* alongside the mole was indeed a diversion. It apparently caused every man of the defence to look westwards, with the result that the blockships coming from the north-east were not engaged until too late.

(b) When the *Vindictive* emerged from the smoke-screen within 100 yards of the mole battery, excitement caused the gunners to fire point-blank at her sides, instead of at her water-line. Consequently no vital damage was done. Had she been riddled on the water-line, she would possibly have been unable to close on the mole, and in any case she (and therefore her landing parties) would never have been able to get away again.

(v) *Attack on shipping at Constantinople by our submarines*

This operation, although its success had, perhaps, but a small effect on the war, teaches to the defence the useful lesson that, however thick be the mine-fields, and however many the booms or net defences, a determined submarine commander provided he has sufficient depth of water in which to maneuver, may at any time penetrate them, and hence that no material obstacle can be a substitute for vigilance in look-out duties and instant readiness for action on the part of all defence personnel. Here again we see the need for a high standard of training.

CHAPTER IV

Developments During and Since the War

The changes in methods and material during the recent war have, indeed, been immense. Perhaps the greatest development, and that which will exercise the largest influence on our future methods, has been the introduction and perfection of a new arm, i.e., the aerial figthing machine. Before we study this new arm, however, it seems advisable to consider what changes have taken place in those we knew formerly. Let us therefore look at the development of the power of attack, i.e, of naval power.

Developments in the attack

The most striking innovations are:

(i) *The increased range of guns.* Where, formerly, it was considered that a fortress would be comparatively immune from damage if hostile vessels could be prevented from closing within 15,000 yards, it is now possible for accurate bombardment to be carried out (provided that means of observation exist) at ranges up to 40,000 yards or even more.

(ii) *The increased speed of ships.* This factor increases the probability of attack, by reason of the added facility afforded to the attacker for rapid concentration for a raid.

(iii) *The development of small craft.* The coastal motor boat, with its small size, high speed, and wonderful steering qualities, has introduced a new power to the close attack by torpedo of vessels lying in roadsteads or harbors. Owing to its small size, it will be exceedingly difficult to detect during the hours of darkness, and its high speed and quick steering will render it a peculiarly difficult target to engage with gun-fire. It is, however, very vulnerable, and a single hit from even the lightest gun will probably be sufficient to cripple it.

(iv) *The light-draught heavy gun carrier.* This type of vessel, known as a *Monitor,* was primarily designed for operating in the shallow waters off the Belgian coast. It is practically unarmored and carries one gun (or two) of the largest size. Its rôle is bombardment of land targets where the small depth of water will not allow of the operations of larger craft. For this reason it is particularly invulnerable to submarines. It is not designed to fight against other warships, and consequently it can only operate during the absence of hostile vessels or when protected by units of its own fleet, but, for the same reason, it can use a type of projectile more suitable for engaging land targets than can the capital ship.

(v) *Artificial fog.* This development, given the required atmospheric conditions, is a very powerful adjunct to certain forms of attack, such as blocking, boom-smashing, or attack by light craft. It can also be employed where long-range bombardment is being carried out by indirect fire. It is, however, a weapon which may recoil on the head of its user, should a change of wind occur unexpectedly, and it also suffers from the disadvantage that it can only be used under suitable atmospheric conditions, so that it may not be available at the very time when it is most desired.

Developments in the defence

As regards the defence, developments have been few, owing to the rarity of attacks. They have been chiefly in the direction of improvements to existing means and methods, rather than in the introduction of innovations, and have mainly affected the ancillaries of coast defence such as means of observation, range-finding, etc.

Developments of the air arm

It is unnecessary to labor the point of the vast changes introduced, both for the attack and the defence, by the development of air-craft.

Where, formerly, we had to consider operations by sea and land only, we now have to make preparations for warfare in a third element. Our ideas, therefore, both of attack and defence must necessarily be largely revolutionized, and our methods will require adjustment, in order to meet the new conditions.

Air-machines, whether in attack or defence, have three main functions to perform, viz: offensive action, reconnaissance, and observation of fire.

Let us examine these activities from the points of view of the attack and the defence separately.

(a) *Aircraft of the attack.* The first, and perhaps the most important, point to notice, is that one of the chief factors in successful attack is enormously strengthened by the advent of aircraft, i.e., the factor of *surprise.* Not only does the immense speed of aerial machines very greatly reduce the time occupied between the inception and delivery of an attack, but their small size and consequent ease of concealment renders the preparation of, and concentration for, attack immeasurably less easy of discovery by the scouts of the defence than in the case of assemblies of naval or military forces. Where, in the old days, we might expect some *days* notice of an impending attack, we shall now probably have only as many *hours.* This consideration, therefore, shows that one of the first requirements of the defence is—Instant readiness for action.

The objectives of an aerial offensive action will be, so far as coast fortresses are concerned, the same as those hitherto accepted as the objectives of naval attack, i.e., firstly, important works, buildings, docks, etc., lying within the defended perimeter, secondly, warships lying in harbors or roadsteads, and thirdly, the actual works of defence themselves. An aerial attack will be made both by bomb-dropping and fire from machine-guns. Owing to the speed at which it will be carried out, there can be no question for the defence of "holding off" the attacker pending the arrival of our aerial fleets, as in the case of bombardment by sea. If our fighting air squadrons are not actually on the spot, the attack will necessarily be finished before they can arrive.

The second function of the attackers aircraft will be reconnaissance, for the purpose of discovering the disposition and activities of the defence. This function may be combined with offensive action as described above.

The third function, observation of fire, will necessarily be an adjunct of a naval bombardment, and, by its means, such bombardment will be possible at the most extreme ranges.

It must be observed that both these two functions will necessitate the presence of the attackers machines over, or in the close vicinity of, the fortress for some considerable time, during which they will be liable to be themselves attacked by gun-fire and by the defender's aircraft. They will therefore certainly be accompanied by fighting machines, for their protection while carrying out their duties.

(b) *Aircraft of the defence.* The main functions of the defender's machines may be stated in order of importance as follows:

Reconnaissance—in order to give timely warning to the garrison of an impending attack by air, sea, or land.

Fighting—to destroy or drive off the attackers machines when approaching the fortress for either of the purposes mentioned above, and also for the protection of the machines engaged in—

Observation of fire— to assist the artillery of the defence in dealing with an attack by naval forces.

Offensive action—the direct attack, by bombing, of hostile vessels.

CHAPTER V

Attack and Defence

As we have seen above, we must be prepared to deal with land attack, naval attack, and aerial attack, therefore our defences must consist of land defence, seaward defence, and aerial defence.

Land defence

It has always been accepted as an axiom that, as a general rule, the land defence of a coast fortress is the business of field forces whether located within the perimeter or operating against the attacker from without. In certain localities, however, no such protection may be available, and, in any case, it will be necessary to provide some means of defence from within, to guard against capture by a *coup-de-main*, before the field army can arrive on the scene. For this purpose every coast fortress must include in its garrison mobile troops of some description. The duties of this mobile force may be stated as:

(a) The close defence of vulnerable points.
(b) To hinder a landing by the enemy, within, or near to, the fortress.
(c) To attack the enemy when disembarked.
(d) To hold the landward front in the case of isolated fortresses, or in the absence of a field army.
(e) To maintain order among the population within the fortress.

The main object of the land defences is to keep the enemy as far away as possible from the fortress. For this purpose, therefore, risks will have to be accepted, and great mobility and a high standard of training will be necessary. In certain isolated places, the guns of the seaward defences are so sited as to be able to engage an enemy attacking from the land, but this is a subsidiary, and not their primary, rôle.

Seaward defence

The defence of a fortress against attack from the sea has, in the past, consisted of:

(a) Extended defence, provided by the navy, and consisting of cruisers, destroyers, submarines, etc., whose object is to seek out and

attack hostile vessels before their arrival within range of the guns of the fortress, and

(b) Local defence, consisting of guns and searchlights provided by the army, and booms, nets, and minefields provided by the navy.

It is important to notice that the admiralty, though approving the principle of extended defence, and though willing to supply the means whenever possible, has always declined to allot mobile forces permanently for the defence of particular localities. This attitude is undoubtedly reasonable, since the main object of our navy is to clear the sea of the enemy's fleets, and not merely to stave off his attacks whenever and wherever made.

As regards local defence the chief point to consider is the coast defence gun. We have seen that the increased power of naval guns, combined with the development of the air arm, maed it possible for bombardment to be carried out at ranges hitherto undreamed of. At the same time we know that the chief deterent to bombardment by capital ships is the fear that they, the important units of the enemy's main fleet, may be destroyed in carrying out what is only a subsidiary operation. And therefore we might assume that long-range bombardment on a large scale need not be anticipated. But here we must remember that the capital ship of to-day is the obsolete ship of tomorrow, though armed with the same gun and protected by the same armor. Hence we must be prepared for bombardment in the future from ships which have all the power of the present-day capital ship, but which, being then obsolescent, the enemy will be prepared to sacrifice. It will therefore, perhaps, be not unfair to lay down certain assumptions, e.g.

(i) That the enemy will not risk his (then) capital ships if possible.
(ii) That he *will* risk his obsolescent ships and monitors, in direct proportion to the importance of the place he is attacking.
(iii) That 40,000 yards is a reasonable range at which we must be prepared to engage him.
(iv) That the guns which we employ must be capable of penetrating present-day deck armor at that range.

For these two latter purposes it is evident that our present heaviest coast defence gun is unsuitable. It must therefore be replaced by a more powerful gun, and it would appear that nothing less than the 12″ would answer the purpose, if, indeed, it is sufficient. Probably a 15″ gun will be required.

Similarly, since attack by cruisers or block-ships, will be carried out by vessels of present-day protection, our medium armament will require to be strengthened, and for this we suggest the 9.2″ or 7.5″ gun, according to the importance of the port.

Our light gun, for defence against torpedo craft, is an important consideration. It will not be sufficient to *damage* a hostile vessel,—it is essential to *stop* her before she arrives at a position where she can do damage. For this purpose, our light armament should consist of 4.7″ to 6″ guns, with perhaps a light automatic gun, or heavy pom-pom, for dealing with craft such as coastal motor-boats.

This re-armament appears, at first sight, to be a formidable matter —but it is not, probably, so large as it seems. We are not proposing to provide against operations by large numbers of vessels, but against individual ships or small groups. Consequently, though we suggest increasing the *power* of our guns, we could probably reduce their *numbers*. Due consideration of the probability of attack at each port, followed by careful siting of the allotted armament, would probably enable us to provide the necessary deterrent against bombardment, and the necessary obstacle to success of other forms of attack.

Guns on railway mountings

Many suggestions have been made, from time to time, that the most economical method of defending our coast would be the installation of heavy guns on railway mountings, running on railways which should be laid along the coast line. The argument in favor of this is that it would deny to the enemy many sea areas from which, at present, he can carry out long range bombardment unmolested by gun fire. There are, however, several arguments which can be advanced against this proposal, among the foremost of which is the loss of accuracy in gun fire. which it would entail. We do not want only to frighten the enemy, but to damage him. And financial considerations demand that we should do this damage with the smallest possible amount of ammunition. In other words, every round should be a hit. Provided that we have a gun, powerful enough to reach an enemy vessel at any range within which it must approach in order to bombard, and sited in such a way that, with aeroplane observation, it can engage a target in any direction within that range, it appears that it would be unwise to sacrifice the advantages conferred on the gun by the possession of a fixed and stable mounting. It would seem that the protagonists of railway guns overlook the fact that coast fortresses are not designed to protect the whole of our sea-shore, but are intended merely to protect important objectives lying within their perimeter.

Aerial defence

As on the sea, so in the air, will it be necessary to provide for extended, as well as local, defence. The former will, of course, be solely the function of the R. A. F. The latter will be the combined duty of the army, with guns and searchlights, and of the R. A. F., with fighting aeroplanes. And here we arrive at a most important consideration. In local defence seaward, the part of the navy is restricted to what may be termed the passive defensive, i.e., defence by means of mines, booms, nets, and other obstructions to navigation. In local defence air-ward, however, it must be accepted that no such passive defence can be completely efficacious, and hence the part of the R. A. F., must be an active defensive. All recent developments seem to show that the R. A. F., is becoming more and more truly independent, and there may well be reason to fear that the air ministry may adopt as regards both extended and local defence, an attitude similar to that of the navy in regard to extended seaward defence. Such an attitude would, of course, be deplorable. For local defence against aerial attack, the defence commander must have, as the chief of his weapons, a definitely fixed number of aeroplanes, and these machines must not be susceptible to removal without his consent. They must be looked upon as a permanent portion of the armament of the fortress, of equal importance with the anti-aircraft gun, since it must be admitted that guns alone cannot at present compete completely with aircraft.

The main objects of the air defences will be to guard against:

(a) Bombing attacks on ships or other important objectives within the fortress.
(b) Bombing attacks on the works of defence.
(c) Reconnoitring or observing aircraft.
(d) Torpedo dropping aircraft.

In order to carry out these attacks with accuracy the enemy aircraft will have to fly at a low altitude. It will be the object of the aircraft of the defence to endeavor to prevent this low flying, by attacking the enemy during his approach to the fortress, but, should he evade the defenders, it will be for the guns of the defence to deter him from close approach or destroy him when carrying it out. An efficient or-

ganization of anti-aircraft guns will therefore be required. These guns should be of the nature of 4" caliber, and should have an effective height of at least 20,000 feet.

There is very little doubt that many of the attacks will be made at night and consequently provision must be made for anti-aircraft searchlights, both of the "sentry beam" nature and fighting lights. These searchlights must be entirely distinct from those of the seaward defence, though of course each will assist the other if not required for its own purpose during an attack.

CHAPTER VI

Conclusion

We have seen that the coast fortress of the future will be liable to attack by land, sea, and air, and that to meet these attacks we shall require military, naval, and aerial, defences. In the case of each form of attack, a combination of at least two of the means of defence will be required. Thus our first and greatest lesson is the need for the closest possible co-operation between the three fighting services.

We have seen that developments of the past few years have greatly enlarged the scale of attack which may be expected. Hence we see that the scale of defence must similarly be greatly extended.

In the remarks above, for reasons of space, little has been said about the progress of what may be termed the ancillaries of attack and defence, such as the various methods of detection and ranging, surface, sound, and sub-aqueous, the development of lethal and non-lethal gas, the methods of producing artificial fog, the use of anti-bomb nets, bomb-proof protection, camouflage, etc. These matters are all more or less in their infancy, but they are advancing with rapid strides, and we must not allow ourselves to fall behind other nations in these respects. Thus our third lesson is the need for continuous and pains-taking experiment and research.

Having learned these lessons, we must then apply them. It has been pointed out that all coast fortresses cannot be treated, for purposes of defence, on the same lines. The first thing to do is to determine the probable scale of attack. This, as we have seen, will depend upon the desirability of the objectives, the distance from enemy bases, and political and natural considerations. Having decided on the probable scale of attack, we can then calculate the necessary scale of defence. And when this has been done, the final step is, obviously, to carry it out. This is the ideal. Is it however, practical? We think not. We have seen that to provide a full scale of defence under modern conditions will, in most cases, entail a considerable rearmament of existing fortresses, and we have to bear in mind that the present financial stringency precludes any expenditure which is not absolutely vital to our safety. Also we must recollect the two 10 year factors mentioned in chapter I, and their bearing on our problems. When looked upon from this aspect, it appears that it would be folly to expend a large amount of money at this juncture, on heavy re-armament of, or on full complements of personnel for, our coast fortresses. There are, however, certain fields of activity which must on no account be starved. We refer to experiment, research, training, and practice. The development of methods of attack and means of attack, though perhaps retarded, will not stand still, and it is incumbent on us to ensure that means and methods of defence are developed in at least an equal degree.

From war experience we arrive at certain deductions, which, however, require modification in accordance with post-war conditions. What, then, may we anticipate as being the condition of our coast fortresses during the next ten years? Guns in a state of "care and maintenance,"

P.Fs. and other instruments dismantled or covered up, mine-fields unlaid, anti-aircraft defences non-existent, and, last but by no means least, personnel cut down to the minimum required as caretakers. This will certainly be the case during the next year or two, while financial conditions are so stringent. But it must not be allowed to continue indefinitely. So long as human nature remains what it is, so long will fighting be the ultimate method of settling differences. Peace Conferences may assemble, Leagues of Nations may record resolutions, and the international policeman may intervene between disputants, but, though these bodies may *dissuade* from or *forbid*, they cannot *prevent*, war.

The statement which forms the motto for this paper was never more true than it is to-day, although war-weariness has, perhaps, blinded us to the fact. We have, no doubt, to face a period of stagnation as regards our coast defences until more money is available for their development. But we must, as soon as our finances allow, begin a progressive and comprehensive re-armament and re-organization on the lines and the subsequent period of development, we must do our utmost, by experiment and research, to keep abreast of every scientific and mechanical advance, and we must establish that close co-operation between the army, the royal navy, and the royal air force, which alone can ensure the proper fulfilment of the rôle for which our coast fortresses are designed.

Training, owing to shortage of personnel, is almost impossible of achievement for the time being. We can at least, however, train as *instructors* the scanty personnel we possess, so that in the brighter days to come they may be able to teach the "new entry." And it seems desirable here to emphasize that it will not be sufficient to rely entirely on the territorial army for the artillery portion of our coast fortresses. Not only does the R. G. A., form an important reserve of very highly trained men for the field army, but, in the critical early days of a war, it will be essential to have our defences manned by personnel who will not require any "shaking-down" process as a prelude to efficiency.

Thus, then, the future which we deduce for our coast defences during the next ten years is:

(a) A period of perhaps two or three years during which the whole of the money available for the fighting services will be devoted, and rightly so, to the organization and perfection of our means of offence, and the passive defence, as represented by coast fortresses, will remain "in status quo." During this time no re-armament or other material development will be possible, and training will be practically nil.

(b) The period subsequent to (a), when the return of financial prosperity may enable us, not only to complete our preparations for the offensive, but also to devote funds to the development of the defensive. During this period, our defensive energies will be turned, in increasing intensity, to the development of our material and the training of our personnel, up to the standard which our war and post-war experience shows to be necessary.

(c) And, throughout the whole of both these periods, we shall be carrying on systematic and pains-taking experiment and research, so that we may ensure for ourselves a position at least abreast of our possible rivals, should the peace of the world again be disturbed.

There is no doubt that the mere existence of the first, i.e., the stagnant, period will exercise a damping effect on the ardor of many an otherwise enthusiastic garrison gunner. But let us remember that, the lower we fall, the greater will be the honor when we have again raised coast defence to the eminence attained by it in the past. And the rapidity

with which we can do this will depend on the extent to which we fit ourselves, during the stagnant period, to instruct those who follow us.

Experiment, research, co-operation training. Let these be the watchwords of our coast defence organization, and we may then look forward with confidence to a time when, with our defences re-armed in accordance with the demands of the two former, and our personnel prepared by the two latter, we may face any or all of our potential enemies, saying, in the words of the song—"We don't *want* to fight, but, by Jingo, if we do—." *The Journal of the Royal Artillery*. No. 4 Vol. XLIX

THE TENDENCY OF WARSHIP DESIGN AS AFFECTED BY THE WAR.—By Sir Eustace T. D'Eyncourt, K.C.B., D.Sc., F.R.S., Vice-president Director of Naval Construction.[1] This summer meeting, taking place, as it is in Paris, appears to demand more than is usually the case at the meetings of this institution some general *résumé* of the present conditions governing the designs of ships generally, and although I do not propose to go into the very large question of mercantile ship design, I venture to think that a few remarks on the present aspect of warship design may not be without interest to the members who are present, and may possibly call forth an interesting discussion from some of our continental members, who have not had very frequent opportunities of attending the meetings in London.

Now that the war has been over for three and a half years, we can glance at the whole situation with a calmer view than could be taken of it at a date less distant from the close of hostilities, when our minds were still working at fever heat to produce continuously improved weapons, both of offence and defence.

It is hardly necessary to point out that in the years immediately preceding the war enormous developments had been made in naval architecture, in marine engineering and in gunnery, and other branches of engineering science directly bearing upon the design and production of war material; but, although this development was very evident in the years immediately preceding the war, as soon as the war started it proceeded at an incredibly increased rate, being largely helped by the fact that during the war the question of cost hardly had to be considered at all, provided that the war material could be so improved and supplied as to aid in the achievement of victory. This factor alone contributed to the extraordinary advance made in every kind of scientific weapon, to a degree which had, I think, never before been approached; for, though in earlier wars the same kind of thing no doubt took place, on all previous occasions science had not progressed to anything approaching the condition in which it was found in 1914, and therefore on no previous occasion had it been possible to make such extraordinary improvements in scientific implements of all kinds. These improvements profoundly affected the designs and characteristics of our ships. Entirely new types were developed and the old types were improved, and as the war proceeded and battles were fought, new lessons were learned and the results were as far as possible embodied in new construction. An interesting point, I think, is that although, as I say, new types had to be developed, yet it was found that all the existing types, perhaps with certain modifications, were of great utility, whether capital ships—battleships and battle-cruisers—light cruisers, destroyers or submarines. Owing, however, to the long time which it takes to construct the heavier classes of ships, the developments made in the smaller types were more marked than in the larger, because the new material was always wanted at the earliest possible moment.

Now that the war is over and we have been able to think more calmly about the whole question of design, certain points stand out which call for more particular study and comment than was the case in pre-war days.

[1] Institution of Naval Architects, Paris Summer Meetings.

One of the principal points to be specially considered is the great development of under-water attack, whether by submarines, mines or torpedoes, all of which greatly added to the danger to which ships were continually exposed. Submarines became much more efficient, mines were laid in numbers over an extent never before dreamed of, and torpedoes were increased in size and efficiency, and were carried in larger numbers by all classes of ships than had ever been previously experienced. It therefore became almost a necessity to pay special attention to the under-water protection of, at any rate, all the more important classes of ships, and it may therefore now be taken, I think, as an axiom that capital ships must have a very large proportion of weight devoted to their under-water defences. In this connection, I think it should be remembered that the older classes of ships which had been designed some time before the under-water attack had become so imminent a danger, in almost all cases came off badly when struck by torpedoes or mines. This was due in part to the inferior protection given to the sides of the ships below water, and also very largely to the fact that in many cases longitudinal center-line bulkheads were fitted which prevented the ships retaining an upright position when damaged on one side; the large amount of water admitted was thus confined to the damaged side only, and in this way many of the older battleships and cruisers capsized. One of the first objects, therefore, was to improve this state of things, and none of our later ships fitted with the newer forms of under-water protection was ever lost by the action of an enemy torpedo.

The second great point of difference which has to be considered in post-war designs is the very much greater range at which actions were fought during the war had been anticipated, and this in spite of the rather unfavorable atmospheric conditions which generally obtained in the North Sea. In future ships, therefore, the ever-increasing range of guns themselves and of the distances at which actions are likely to be fought must be kept in view to an extent not contemplated in earlier designs. Before the war it was thought that actions would be fought at perhaps something under 10,000 yards range. Now provision has to be made for ranges fully twice as great. To the ordinary observer it might not appear that this difference would very profoundly affect the designs of our ships, but a very little consideration shows what an important matter it is. At ranges under 10,000 yards the projectiles, as a rule, when striking the object, are coming down at an angle of certainly not more than fifteen degrees to the horizontal, whereas at the greater ranges the angle of descent of the projectiles may be thirty degrees, or even more. At the steeper angles of descent the decks of the ships present a larger target than the sides, and with the old thicknesses which were given to protective decks in former designs, the larger shells would have no difficulty in penetrating to the vitals, so that one good shot from a big gun might enter a magazine and explode it, thus destroying the ship in a moment. It therefore becomes a paramount necessity to increase as far as possible the thickness of protective decks over the vital parts of the ship, whilst we still have to maintain the armor belt in the neighborhood of the water line in order to preserve intact the water-plane and the stability.

A further point necessitating special attention being paid to the protection especially of decks is the new menace of attack from the air. This has added an entirely new factor to modern naval warfare, though even at the end of the war this method of attack had not really been developed nearly as highly as it is likely to be in the future.

The naval designer, therefore, at the present moment is faced with the necessity for providing against new forms of attack both above and below water, all of which demand greatly increased weight in the working out

of the design. At the same time he is offered no compensating advantage, or very little, in the reduction of side armor or any other item; for as the size and weight of the guns have continually increased, so had also the demand for increased speed, and therefore the weight of propelling machinery, boilers, fuel, etc.

Some advance has no doubt been made in the improved quality of steel, but any slight saving in weight of structure which can be made by the introduction of better material is not at present enough to compensate for the increase of weight due to additional items such as wireless and control apparatus and many other additional fittings.

These considerations, therefore, taken together, have tended to produce very large and very costly capital ships, and they would no doubt have increased to an enormous extent had not some limit been put to the size of ships and guns by the Washington Conference. In view, therefore, of the general necessity all over the world for economy of financial resources, if for no other reason, the enactments of the Washington Conference should be welcomed at any rate by the taxpayer, if not by the men of the fighting forces themselves, and I may perhaps add, by the naval architects and suppliers of munitions of war.

Consideration of these points naturally leads to the questions: Are these enormous ships worth building? Can they be regarded as necessities? Can they be relied upon as the best means of defence and attack, or will they become an easy prey to some of the new methods of attack which have been enumerated?

Although the increased efficiency of attack under water, and also from the air, demands our earnest attention, nevertheless experience shows that the exaggerated claims of the enthusiasts who favor submarines on the one hand, or those who advocate aircraft on the other, should not be allowed to carry too much weight. For novel weapons it is always claimed by their advocates that at last an arm has been discovered which supercedes all others, and may, in fact, put an end to war, so irresistible is its power compared to that of all previous war material. Such claims have in the past been advanced for the rifle, the big gun, the machine-gun, the torpedo, the torpedo boat, the submarine, and many other engines of war, but every time experience shows that the potency of new inventions can be met by some antidote, which largely discounts the value of the idea, and experience compels the claiments of irresistible force to modify their earlier optimistic prophecies of the wonderful results of their discoveries.

It is hardly necessary to go into all the arguments of the necessity for having capital ships; but after weighing all the facts, it is generally admitted by competent authorities that as long as ships of any kind sail on the surface of the seas, the most powerful surface craft will always be the principal unit of any fleet.

As far as defence goes, at the moment our experiments and actual trials on the full scale show that we can make our ships reasonably secure against under-water attack from mines or torpedoes or from bombs dropped in the water alongside. Further, I consider that the decks can be so thickened as to be able to withstand modern gunfire at long range, or any bomb of weights which can at present be carried, provided always that too great demands are not made upon the naval architect to carry an abnormal weight of artillery or that the ships should at the same time be capable of very high speeds.

One thing is quite certain, viz., that with the enormous cost of capital ships, no wise man, whether he be a naval officer or statesman, would advocate the construction of the most expensive type of ship in these days of necessity for economy, unless he were convinced of the need for having them, and no experience of the war or experiments since the war show

that it is possible to do away with capital ships, and to devote all the money available to the construction of cruisers, submarines, destroyers and other types. All these types are no doubt necessary adjuncts, but the most powerful capital ship it is possible to construct still remains the prime necessity of any first-class navy.

As regards other classes of vessels, the war showed the necessity, as I have said, of nearly all the classes previously developed, which was, I venture to think, in itself a testimony to the foresight and intelligence of the naval officers and naval architects of the various great navies of the world. Demands were made in every class of ship for more speed, more armament, and more protection, so that every type tended to get larger and larger. This is seen in the continually steady increase in size of light cruisers, of destroyers, and of submarines. Perhaps the development of the latter of these classes was the most remarkable of all, and showed a greater percentage of increase of size and of speed in the same period than had been achieved in any other type of vessel. It is only a few years since the largest submarine was of a few hundred tons displacement. At the end of the war there were submarines of 3,000 tons weight and having speeds up to 24 knots; and the British navy had developed some experimental boats carrying a 12in. gun.

An entirely new type of ship, which was developed during the war, was the aircraft carrier. At first small merchant ships were taken up and adapted for this purpose, but as the necessity for carrying aeroplanes at sea became more and more insistent, larger vessels were taken up, and the special arrangements for flying on and off were developed to a very high degree. Although most of the aircraft carriers are still converted ships built originally for other purposes, the alterations are so extensive that the ships as converted practically amount in many cases to an entirely new design. These vessels, which really correspond to the large hangars on land at the back of the fighting armies, are required to keep up with our fleets and therefore to have high speed, to have good sea-going qualities, and to be steady platforms for flying off and flying on, with all special fittings and arrangements necessary to carry out these operations successfully; and there is very little doubt that large aircraft carriers will in the future form an integral and absolutely necessary portion of any first-class fleet; and, further, these vessels will no doubt be specially designed for the purpose and developed to even a greater extent than has hitherto been the case.

It would seem to be difficult to arrive at any finality in the design of aircraft carriers, owing to the immense progressive development of aeroplanes, especially those of the larger classes designed to carry heavy bombs and other weapons of attack. To arrange for the safe flying off, landing, and stowage of these big machines has given the naval architect new problems in ship design, which appear to call for quite as much inventive genius as many of the older problems with which naval architects have hitherto been faced.

Reviewing the whole situation generally of the tendency of warship designs as affected by the war, it appears that the naval architect has to deal with an even more complicated set of requirements which must be met in the up-to-date warship than ever was the case before; for, in spite of the fact that the war lasted over four years, no finality was reached in the development of any of the weapons of war which were in use up to the armistice, so that, although the ship designer is aware of the many varied and difficult problems which presented themselves to him during the war, most of which he successfully overcame, he has still to consider the further problems of more or less unknown character which the enormous development of science has brought about in the ever-increasing

power of weapons of offence and defence which have to be provided for in the design of warships.—*The Engineer*, 7 July, 1922.

SOME OF THE CONSEQUENCES OF THE WASHINGTON CONFERENCE WITH REGARD TO NAVAL CONSTRUCTION.*—After outlining the restrictions imposed by the Washington Conference the author observes that the 35,000 tons maximum displacement allowed by the Conference is not sufficient if the problem of the present-day battleship is to be solved "without compromises." Is it possible to make better provision in view of possible progress of technical knowledge, or on the basis of acceptable modification in the actual requirements of modern battleships? In order to arrive at a conclusion he then briefly examines the various requirements of the modern battleship, indicating some possible modifications. He concludes that it will not be possible to adopt guns of less than 16in. caliber, and he regards it as not impossible, especially in southern seas, that new means of fire control and spotting may enable the range to be still further increased, considerably beyond the horizon.

Discussing the minimum number of guns, he observes that there would seem to be a possible way of reducing the displacement of battleships in the near future, by building "super-rapid" gun mountings, which would require only ten seconds between each shot, and possibly even less. Naturally, a gun with "super-quick" firing would weigh considerably more than one of normal design, and therefore there follows the necessity of insisting on an increase in the number of guns of each turret, following the advice of the Italian engineer constructors Ferrati and Madsea.

Turning to secondary armament, the author remarks that it is necessary to have a single type of mounting, naval and anti-aircraft, in the guns of medium caliber up to 6in.; thus uniting the anti-aircraft and anti-submarine guns. Designs on these lines are already well advanced, so that the problem may be considered as already nearly solved. But the actual number of guns in these batteries should be increased from the present twelve to sixteen, and, on the whole, rather than consider a reduction in the weight of secondary armament, we must frankly face a considerable increase. As to the use of larger ships as platforms for aircraft, the author says it would seem that this will have to be limited, at least for the present, to the smaller aeroplanes for reconnaissance and observing of shots, launched by means of catapults similar to those in use in the American navy.

In conclusion, as regards offensive power, we may say that the only direction in which we can hope to effect the reduced displacement of future battleships is by a radical modification of the heavy artillery, which would allow of a diminution, to a certain extent, in their number. Reduction in the lesser armament and in under-water protection does not seem either possible or advisable.

On the subject of defence the author discusses side protection, deck protection, and under-water protection. For the side protection we must still have recourse to massive external defences. As a defence against 16in. shells, plates of equal thickness would probably be necessary, even at long ranges. But even by reducing the vertical protection to the indispensable minimum no great advantage as regards weight can be obtained. The utmost importance is given, and rightly, to the deck protection, as the horizontal target is by far the greater, not only in aerial attacks, but also against artillery at the actual ranges of battle.

Under-water defence is now of fundamental importance and is allied to the strength and stability of the ship. The three known fundamental so-

* *Résumé* of paper read by Major L. Fea, of the Royal Italian Navy before the Institution of Naval Architects, Paris Summer Meetings.

lutions of the problem are: The bulge system, proposed and experimented upon by General Ferrati in 1911, and largely used in the British navy: the system of water-tight compartments, investigated in 1892 by the late General Benedetto Brin, which is largely used in the American navy; and the system of "hydrodynamic action" of Colonel Pugliese. Other systems have been tried with success, but these three, which are based wholly or in part on metallic structures or large masses of liquid, are those which have the greatest probability of being retained in the future, as the weight of liquid fuel is not inclined in the "standard displacement" of Washington. Here we see that the Convention of Washington may have some curious results upon naval construction, almost as the tonnage rules have had upon mercantile naval construction.

A further system of defence will in future have to be provided, that is, against poisionous gas, whatever may be the consequence of the Washington Conference as to the abolition of this gas in future wars.

As regards the intrinsic qualities of the ship, advantages can only be obtained by means of steady and continual perfectioning of the design and material. These improvements might, amongst others, relate to:

(1) The use of more perfect materials.
(2) The general use, if possible, of welding instead of riveting.
(3) The incorporation of the protective elements with the structural ones.

Concluding, the author says that the analysis which we have made regarding the various qualities, naval and technical, of the modern battleship does not leave us any illusions as regards the impossibility of being able to comprise within the limits of displacement fixed by Washington all the offensive and defensive power which at the present day would seem desirable. It would be well to note that, whatever may be the road which it will be necessary to follow in order to gain this object, two conditions must be observed: a systematic and profound study of all the material which is necessary for the construction of such a complex machine as the modern warship; and very great expense, which may cause one to doubt whether the ship of the future of 35,000 tons imposed by the Washington Conference will really cost the various governments much less than the present-day ship of 40,000 tons.—*The Engineer*, 7 July, 1922.

NAVAL DESIGN AND THE WASHINGTON CONFERENCE.—Sir Philip Watts has made a written contribution to the discussion on the above subject at the Paris meeting of the Institution of Naval Architects, which was reported in our issue of the seventh instance. This discussion followed the reading of papers by Sir Eustace D'Eyncourt on "The Tendency of Warship Design as Affected by the Washington Conference," and by Major L. Fea of the Royal Italian Navy, on "Some of the Consequences of the Washington Conference with regard to Naval Construction." Sir Philip's contribution is as follows:

Sir Eustace d'Eyncourt's paper is a most interesting contribution to the series of papers on warship design which our transactions for the past four years contain. The series includes my paper in 1919, which gives a fairly full statement of the design particulars of the ships of the British royal navy at the outbreak of the war, and in the same year Sir Eustace d'Eyncourt's paper which dealt with warship construction during the war; then followed in 1920, a paper from Sir Eustace on H.M.S. *Hood*, and, in 1921, notes from him on German warship construction. Also, in the same year, there was a paper by Mr. S. V. Goodall, constructor in the royal corps of naval constructors, on the ex-German battleship *Baden*; and, in our spring meetings of the present year, we had a paper by Mr. J. H. Narbeth, assistant to the director of naval construction, giving certain

particulars relating to the designs of *King Edward VII*, *Lord Nelson*, and *Dreadnaught*. All of these papers were freely discussed by many naval officers and naval architects concerned with warship construction.

Sir Eustace's present paper deals with the aspect of the problem, subject to the restrictions of the Washington Conference, which in simple terms, involves the limitation of the number, displacement, and gun caliber of our capital ships. As contingent on these, we have to consider the following: (1) The best available protection from attack by enemy aircraft. (2) The best available deck protection from projectiles dropping from enemy guns. (3) The best available above-water broadside protection from enemy guns. (4) The best available protection from underwater torpedo attack, whether fired by submarines, torpedo craft, larger vessels, or otherwise. (5) The best available protection from mine attack. (6) The highest available gun power. (7) The highest available speed.

There are of course, other elements involved, *e.g.*, radius of action, but the above may, I think, be taken as the principal features.

Sir Eustace does not give many detailed particulars of the methods by which it is proposed to secure the best balance, between all the conflicting elements of the problem. These, of course, we cannot expect. Our own and other admiralties, at the present moment, are engaged in maturing their designs; and no one of them is likely to make an early pronouncement on the subject. To use a well-known phrase, we must "wait and see."

Sir Eustace's remark "that all the existing types, perhaps with certain modifications were of great utility," is perhaps rather fainter praise than he intended. Those types had to meet the enemy in all the principal naval actions, and it was with them the war was won. All the principal ships engaged at the Falkland Islands, Dogger Bank and Jutland were of pre-war design.

Sir Eustace points out that the older classes of battleships and cruisers (pre-*Dreadnaught* ships) in almost all cases came off badly when struck by torpedoes. Most of these vessels which were sunk by a single torpedo were protected by a longitudinal vertical bulkhead along their side; when struck, the side was smashed, the adjacent compartments flooded and the ship capsized from lack of stability. In some cases the upsetting couple would have been less if there had been no middle line bulkhead. In all cases the vessels sank through insufficient stability, and if they had had sufficient stability, possibly none of them would have been lost. The newer forms of under-water protection referred to by Sir Eustace mainly depend on increasing the beam or breadth of the ship and thereby increasing her range of stability. The extent to which protection can be given against torpedo attack by placing armor and other resisting material in the side spaces is limited; a torpedo may get under the turn of the bilge and explode beyond this protection, and when the ship rolls to a comparatively small angle the whole of her bottom is exposed to attack, the target may be doubled or more than doubled and most of it will be quite unprotected. The greatest safety lies, after reducing the size of the compartments to a minimum by suitable subdivision, in providing the most stability that is consistent with other essential requirements to keep the ship upright as long as possible, if compartments be flooded in succession. It may be true that we can "at the moment" make our ships "reasonably secure" against torpedo attack, to the extent, say, of two or even three explosions, when they are upright and not rolling, but underwater attack must be expected to grow in strength, torpedoes can easily be made of any desired power and can be produced in a comparatively short time.

With regard to the greater range at which actions were fought, I am not sure that I am quite in agreement with Sir Eustace. In one of the early conferences held by Lord Fisher on the *Dreadnaught* design, the

probable course of events in an action supposing two hostile fleets or squadrons equally intent on fighting were to meet, was discussed, and it was agreed that firing would commence as soon as they got within such a range that there was a reasonable chance of hitting, say, 14,000 yards with the 12in. guns of that day, which with 13½ degrees maximum elevation, have a range of 15,000 to 16,000 yards. This was in the minds of the officers who had to deal with the distribution of deck and side protection. (Fighting at these ranges actually occurred in the war at the first encounter in 1914 when Admiral Sturdee's squadron met Von Spee's also at almost every encounter afterwards.) What we did not complete in the *Dreadnaughts* was that descending shell would get through our upper and main decks and fittings and travel considerable distances without exploding; it was anticipated that the shock would cause the fuse to act and the shell to burst before reaching the protective deck. This was pretty much the view held when war was declared. We soon found, however, that the German T.N.T. shell with delay action fuses could penetrate our decks and travel considerable distances before exploding. This is why we had to increase the thickness of our armor decks over the vital parts of the ship.

I concur most heartily with Sir Eustace's statement that: "The most powerful capital ship it is possible to construct still remains the prime necessity of any first-class navy." Much has been said to the contrary, but I strongly support Sir Eustace in his view. Lord Selborne, who was at one time, and a very critical time, first lord of the admiralty, and has given great attention to the matter, said in his place in the House of Lords, on June 20 last: "The admiralty has done great service by standing fast on the question of capital ships. So far from the days of the capital ship being numbered, the lessons of the war prove the contrary."

Sir Eustace's paper is, in part, historical, but it is, as, no doubt, it was intended to be, mainly a suggestive one; it states some broad views on important matters and concentrates attention on the difficulties of the general problem, and I submit we are very much indebted to him for it.

Major Fea's paper is one of very great merit. It gives us another example of which many have been furnished, showing how very thoroughly Italian officers study matters relating to the design of warships. In fact, the matters involved here have been so fully and so clearly dealt with that I find very little to say inside of the general scope of what is presented to us beyond what Major Fea has himself said. I am, generally speaking, in entire accord with all Major Fea states.

There can be no doubt that the decisions of the Washington Conference create an entirely new position as regards the problem of warship design and that much time and skill will be required successfully to meet the new conditions arising therefrom.

I am particularly interested in Major Fea's statement as to the possibility of reducing the number of the principal guns in a battleship when associated with great rapidity of loading, properly related to the time of the rolling of the ship, without real sacrifice in the offensive power of the main armament. I am not so sure that I agree with the proposal of Monsieur Doyére, referred to in the paper, "to employ quadruple turrets." If the guns are to be 16-in. guns, the resulting turret must not only be very large, involving special difficulties, but the concentration of such a large portion of the main armament in one turret involves a very serious risk of many guns being thrown out of action by a single blow.

I concur in the remarks made by Major Fea in his paper as to above-water armor-deck protection, particularly where he says "In other words, it would be advisable to sacrifice the part of the ship above the principal protective deck as long as we can, at any cost, save the one underneath." Major Fea has done well, I think, in calling attention again to the desirability of incorporating, as far as possible, the protective elements of a

vessel with the structural features. This method of construction was adopted by me in the designs of the modern light cruisers of the British navy. The difficulties of actual building were, of course, increased in comparison with those of earlier ships, but the resultant gain was considerable. I submit, that we are very grateful to Major Flea for his most excellent paper.—*Engineering*, 21 July, 1922.

THE VINDICATION OF THE CAPITAL SHIPS.*—All doubt as to whether the construction of our two "post-Conference" battleships would be undertaken has now been set at rest by the first lord of the admiralty, who stated in the House of Lords on July 11 that the government had not reconsidered its decision to proceed with the building of these vessels, nor did it intend to do so. The necessary designs, he added, had already been worked out and approved, and were ready for the use of the builders. The actual date of laying down the ships is not yet known, but, according to the first lord's memorandum on the navy estimates, it will be "early next year." In the measured judgment of the admiralty it is feasible to make the new battleships "reasonably proof against any known likely methods of attack," an opinion which is based on the experience derived both from war operations and a long series of experiments presumably carried out since the war. In view of the high professional competence of the present board of admiralty—all of whose naval members saw prolonged service afloat in the late conflict—the public at large will be inclined to accept as final its verdict as to the indispensability of the capital ship True, it is warmly challenged by several naval officers of distinction, who believe the armored leviathan to have been rendered obsolete by submarine and aerial methods of offence, and support their thesis by arguments which might be conclusive if they rested on demonstrated fact instead of surmise As it is, however, the case for doing away with the battleship has not been proved, and in these circumstances the country is satisfied with the decision of the responsible controllers of its naval policy that two new capital ships shall be added to the establishment at an estimated total cost of £16,000,000. It seems an exorbitant sum to pay for only two ships, considering that eight pre-war *Dreadnaughts* could have been built for the same nominal outlay, but some allowance must be made for depreciation in the purchasing power of money. Probably, therefore, it is accurate to say that the cost of the battleship has doubled rather than trebled. Even so, there would be good reason to question the wisdom of spending so much money on new vessels of this type if it were certain that they could be destroyed as easily as their critics affirm. We are told, for instance, that "one bomb dropped by an aeroplane could sink the strongest battleship ever built or projected." No doubt it could, provided the ship was a stationary target, deserted by its crew, incapable of offering any active resistance, and that the aeroplane could drop a heavy bomb in the precise position where it would explode with maximum effect; but such a conjunction of favorable circumstances would be most unlikely to occur under war conditions.

It seems to us that critics of the battleship display too much imagination and too little regard for actualities. Although few of them appear to be aware of it, they are repeating much the same objections to the heavy ship as were raised in some quarters forty to fifty years ago, when the potentiality of the big gun and the torpedo was urged as a reason for building no more warships of large tonnage. Then, as now, the anti-battleship party was able to quote authenticated data in support of its views. As evidence that the heaviest ironclad might be wrecked by a single shot they pointed to the ease with which thick armor had been holed at the proving butts in England, France and Germany by the monster guns which each of those powers had constructed; while the resistance trials in England and similar experiments on the continent were

cited as confirmation of the theory that a single "fish" or spur torpedo could destroy the buoyancy of any man-of-war afloat. They either overlooked or discounted the fact that proving ground results were notoriously misleading as a guide to the performance of ordnance when mounted on shipboard and worked under battle conditions, just as they grossly exaggerated the chances of successful torpedo attack in the confusion and turmoil of a fleet action. As regards the first point a commentator of 1881 observed that "the superiority of the gun becomes much less marked under the practical conditions of a naval engagement. It is possible, as it has been shown, to penetrate the heaviest armor, but in experimental firing the targets are fixed at short distances and receive perpendicular blows from guns which can be laid with the utmost accuracy. These are conditions which can rarely obtain in an actual engagement." Subsequently the difficulties of carrying out torpedo attacks and the shortcomings of the new weapon were demonstrated by naval operations in the Black Sea and South American waters, and in the end the continued supremacy of the battleship was conceded by all save a negligible minority. The parallel between this early controversy and the one now in progress is sufficiently close to merit attention. Present-day opponents of the great ship are particularly impressed—or shall we say obsessed?—with the devasting effect of heavy aircraft bombs detonating below the water close alongside, as happened in the *Ostfriesland* trials. From what resulted on that occasion it was clear that serious damage had been inflicted. The *Ostfriesland* did, in fact, sink, but not so rapidly as to refute the suggestion that had there been a well-trained crew on board she might have been kept afloat. That the ship was perfectly motionless during the attack we know, and it is admitted that the airmen released their bombs from a height considerably less than they could have maintained with safety had they been under the fire of well-served anti-aircraft guns. On the whole, therefore, this particular experiment bore no more relation to war conditions than did the proving-ground artillery experiments or the torpedo trials of a generation ago, and it is not surprising that the admiralty should decline to abandon battleships merely on the strength of a single inconclusive demonstration. The matter would, of course, assume a very different complexion were it certain, first, that battleships will in future be frequently exposed to attack by the heaviest types of bombing aircraft; and, second, that a fair proportion of large bombs will fall on or close alongside the objective; but no such certainty exists. No doubt hits would be made from time to time, the effects of which might be disastrous, but in our judgment the contingency is not a sufficient pretext for discontinuing the building of large warships. The impression probably left in the mind of an uninstructed reader by much that has been written in the course of the newspaper controversy is that, prior to the advent of the submarine and the aircraft, battleships enjoyed almost complete invulnerability and were in no danger of that summary destruction with which they are threatened now. That, needless to say, is an entire fallacy. Large caliber projectiles containing a high-explosive charge have long represented a formidable menace even to stoutly armored chips, a menace which has become particularly serious since the introduction of the *Dreadnaught* type, with its large battery of heavy guns and the consequent development of salvo firing. Jutland furnished an object lesson on the tremendous power of modern naval artillery, for in that action several great capital ships were utterly destroyed by a few salvos of shell fired at long range. Whatever the anti-battleship school may assert to the contrary, it is none the less true that a large vessel can be made reasonably safe against under-water explosions by bulge and other forms of protection, which in a perfected form ought to confer the same degree of immunity against aircraft bombs as against

torpedoes. But it is practically impossible to design a ship which shall be impermeable to heavy gunfire. If, therefore, the gun platform can be made secure against exiguous attack below the water-line, there would seem to be no reason for doubting the continued primacy of the capital ship, which is essentially a platform for the carriage of heavy ordnance. Such security was declared to be attainable by Sir Eustace d'Eyncourt, the director of naval construction, in his paper at the recent Paris meeting of the Institution of Naval Architects, and is confirmed by Sir Philip Watts in his written remarks on that paper which we print today. We have no doubt this double assurance from two of our greatest warship designers will carry more weight with the public than unsupported statements to the contrary by critics of the admiralty's shipbuilding policy.

As we have remarked, the position today is fundamentally similar to that which existed nearly fifty years ago, when the advent of the locomotive torpedo raised doubt in many minds as to the expediency of continuing to build costly armorclads, and when ardent torpedoists were no less positive than our present-day aircraft enthusiasts that the great ship had lost its *raison d'être*. Naval opinion fortunately took the longer view, as in the main it does at the present juncture, with the result that Britain remained supreme on the ocean for a further generation by virtue of her splendid armor-clad fleet. We venture to think that the following words, spoken as far back as 1877 by the late Sir E. J. Reed in a discussion on "Warships and Torpedoes," are as apposite to the circumstances now prevailing as when they were uttered: "Here, then, we have every power furnished with the means of attacking our large warships, so cheap and so simple that few powers are too petty or too impecunious to provide them on an emergency, while the larger powers could, with the financial means at their disposal, completely compass and surround our few largest and finest ships with those agents of destruction. In my opinion this state of things imposes altogether new and solemn obligations upon our naval administrators, and the objects to which it points are clearly twofold—first, the construction of our large ships on principles which make them as little destructible by torpedoes as by guns, which I believe to be quite possible; and, secondly, the building of all our other warships of small and handy types, and with the necessary improvements. With these objects neglected, we shall be placed in a position of serious disadvantage and danger; with these wisely and scientifically attended to, Britannia may in the coming days, as in the past, continue to rule the waves."—*The Engineer*, 21 July, 1922.

THE VULNERABLE PART OF A BATTLESHIP.*—Is armor plate no longer the index of a battleship's power or resistance? Has the airplane bomb made the lighting, communication and condenser systems of fighting craft the vital vulnerable parts of their equipment? These questions are receiving the most careful study by naval engineers throughout the world.

The main protective feature of the battleship, its armor plate, is no defense against the airplane bomb. This is conceded by those who are open-minded and want to know the truth. The huge appropriations for steel for this purpose may disappear in a few years if the power of aircraft is allowed to be tested.

It is a new fundamental in sea warfare that the vulnerability of a battleship to bomb attack bears no possible relation to its armor plate, as the armor plate does not perform any function in this respect. The armor plate only goes a short distance below the water line. Therefore, a bomb dropped in the water not far from the ship and exploding at a

* EDITOR'S NOTE. The above two editorials are reprinted with the view of calling attention to civilian estimates on the value of airplanes versus battleships.

depth of fifty or sixty feet, would act against the thin structural plate below the armor and on the bottom. This could not stand very much external pressure, being much less in structural strength than the hull of a submarine, and we know, from experiments, that a submarine can be sunk by an ordinary depth charge of three hundred pounds of T.N.T. exploding at a distance of three hundred feet. Such pressure is about 1,200 pounds to the square inch. It is therefore inevitable that an airplane bomb weighing four thousand pounds, with twenty-five hundred pounds of T.N.T. would sink any battleship now built or likely to be built, if exploded within a few feet of the hull.

The real points of attack of the airplane bomb are the structural plates on the bottom of a ship, and the lighting, communication and condenser systems of a battleship. These vital parts of any seacraft are not able to withstand earthquake shocks such as come from the heavy explosive charges of large bombs timed to explode alongside a ship.

The people of the United States should call on Congress to prove to them by experiments with old battleships properly strengthened that the present battleships and those building can withstand an attack from the air before more of the people's money is spent on vulnerable structures and, more important, before an enemy proves the truth of this fact by demonstration in time of war.—*Aviation*, 24 July, 1922.

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* These works are published by Augustin Challamel, 17 Rue Jacob, Paris.

NOTES ON INTERNATIONAL AFFAIRS

FROM JULY 5 TO AUGUST 5

PREPARED BY

ALLAN WESTCOTT, Professor, U. S. Naval Academy

GERMAN REPARATIONS

REQUEST FOR MORATORIUM.—On July 12 Germany presented to the Reparation Commission a formal request for complete relief from all cash payments of indemnity until January, 1923. In reply the commission insisted upon prompt payment of the 32,000,000 gold marks due on July 15 (after a reduction of 18,000,000 marks for delivery of coal and dyes), and set August 15, as the date for a decision on the question of a moratorium. The Special Commission on Guarantees returned to Paris from Berlin, and on July 19 reported that Germany had consented to Allied supervision of German finances, including budget, exports and imports, publication of statistics, and recovery of evaded capital. In view of this attitude on the part of Germany, it was thought a majority of the Reparation Commission would report favorably on delay or reduction of indemnity payments.

REDUCED PRIVATE DEBT PAYMENTS DENIED.—At the same time as her request for a reparations moratorium, Germany presented directly to France a request for reduction from $10,000,000 to $2,000,000 of the monthly payments pledged by the German Government on debts of German nationals to Allied citizens contracted prior to the war. This request France refused in a sharp note setting 10 days as a limit for Germany to signify continuance of full payments. Upon a subsequent German refusal, France sent a 4-day ultimatum, with threats of seizure of German property in case of failure to comply.

MEETING OF PREMIERS ON AUGUST 7.—At the close of July, Premier Lloyd George sent to Premier Poincaré, and also to the Belgian and Italian Governments, invitations to a conference in London on Aug. 7. The chief business of the conference was to be the question of delayed or reduced payments on the German indeminty, though the Tangier and Near East questions were also up for consideration.

ENGLAND DEMANDS PAYMENT.—In an important note sent to France and other powers on August 1, the British Government declared that, in view of the insistence of the United States on payment of the British debt,

Great Britain would be forced to insist on payment of debts owing to her, though she would have preferred a policy of general cancellation. The note, apparently intended for American reading, is summarized as follows:

London, August 1 (Associated Press).—The British Government cannot treat the repayment of the Anglo-American loan as if it were an isolated incident in which only the United States and Great Britain had any concern, said the note addressed by the Earl of Balfour to France, Italy, Jugoslavia, Romania, Portugal and Greece.

Declaring it is regretfully constrained to request the French Government to make arrangements for dealing to the best of its ability with the Anglo-French loans, the British Government says it desires to explain that the amount of interest and repayment for which it asks depends less on what France and the other allies owe Great Britain than on what Great Britain has to pay to the United States.

The policy favored by his Majesty, the note states, is that of surrendering Great Britain's share of German reparations and writing off, through one great transaction, the whole body of interallied indebtedness.

"But if this is found to be impossible of accomplishment," the note says, "we wish it to be understood that we do not, in any event, desire to make a profit out of any less satisfactory arrangement. In no circumstances do we propose to ask more from our debtors than is necessary to pay our creditors.

"And while we do not ask more," it continues, "all will admit that we can hardly be content with less; for it should not be forgotten, though it sometimes is, that our liabilities were incurred for others, not for ourselves."

Pointing out in conclusion that it is not merely a question among the Allies, because former enemy countries also are involved, and the greatest debtor is Germany, the note declares that the government does not suggest, either as a matter of justice or expediency, that Germany should be relieved of her obligations to the other Allied States. But Great Britain would be prepared, subject to the just claims of other parts of the Empire, to abandon all further right to German reparations and all claims to repayment by the Allies provided this renunciation should form a part of a general plan whereby this great problem could be dealt with as a whole and a satisfactory solution found.

A general settlement, in the view of the British Government, the note says, would be of more value to mankind than any gains that could accrue from the most successful enforcement of legal obligations.

GERMANY

BAVARIA ASSERTS STATE RIGHTS.—The German Government was in difficulties at the close of July, over the refusal of Bavaria to enforce the stringent federal laws recently enacted for safeguarding the republic, and directed against monarchist activities. Bavaria objected chiefly to what she regarded as federal interference and especially to the provision for the trial of offenders under the new act in a special federal court of Leipzig. Instead of promulgating the law, therefore, she proclaimed modified ordnances of her own.

Bavaria's action appeared in violation of Article XIII of the Weimar Constitution providing that "Reich's law breaks land law" (i. e., law of individual states). President Ebert evaded a crisis by sending a letter to

Premier Lerchenfeld of Bavaria on July 27, citing the power of the Reich to make null and void the measure adopted by the Bavarian Diet, and calling upon the Bavarian Premier to consider whether it was not possible to avoid this action. A federal court at Munich was feasible if this offered a solution.

GREAT BRITAIN AND IRELAND

CIVIL WAR IN IRELAND.—Following the downfall in Dublin of forcible resistance to the Free State Government, the center of hostilities shifted to Limerick and Southwestern Ireland. Limerick and also Waterford fell to the government forces on July 21. The Free State Troops attacking Limerick were estimated at about 700 and the irregulars about 1,000. Subsequently the government forces reported slow but steady progress, and strong support from the civil population. On July 30, they captured Tipperary and were closing in on Kilmallock.

ITALY AND THE NEAR EAST

FACTA CABINET REORGANIZED.—The Facta Cabinet in Italy resigned July 19, after 4 months' existence, during which the chief event was the Genoa Conference. Its overthrow was accomplished by a combination of Socialist, Democratic, and Catholic parties, the latter withdrawing their support owing to the government's failure to take stronger measures against the Fascisti.

Great difficulty was experienced in organizing a new ministry owing to the inability of leaders to get parliamentary support for a strong policy against either of the extreme elements in Italy—Fascisti on the one hand and Communists on the other. The Fascisti leader Mussolini on July 19 threatened open insurrection, declaring no cabinet that employed force against the Fascisti could rule in Italy. On the opposite side, the Socialists blocked ex-Premier Orlando's efforts to form a new cabinet by insisting that it be made up entirely from the parties by which the former cabinet had been overthrown. The old Facta Cabinet was finally reorganized, with ten members retained and five new ones added, without much change in its political alignment.

GREEK THREATS IN THE NEAR EAST.—On July 27, the Greek Government sent a note to the Allied powers declaring its intention to resume entire liberty to take what steps it thought fit, to end the war on the Turkish nationalists. At the same time troops to the estimated number of 25,000 were concentrated at the port of Rodosto and 70,000 along the whole Thracian front in an apparent threat against Constantinople.

Allied forces in the city (about 10,000 in addition to the British squadron) at once took precautionary measures, and the Allied Governments sent warnings to Greece. On July 31, Premier Lloyd George announced that Greece had reaffirmed her promise not to invade the neutral zone without the consent of the powers.

On July 30, Greece issued a proclamation declaring a regime of self government in the regions of Asia Minor occupied by the Greek troops, the new state to be known as Occidental Asia Minor. This move was contrary to the Allied peace proposals of last March, which provided for complete Greek evacuation.

These measures of King Constantine's Government were interpreted as efforts on his part to bolster up his power at home by assuming an aggressive policy abroad.

RUSSIA AND NORTH EUROPE

CLOSE OF HAGUE CONFERENCE.—On July 16, when the Hague Conference on Russia was on the point of breaking up, the Russian delegates put forward new proposals in the form of a request for a statement of the total amount of compensation desired for foreign property in Russia, and an agreement to settle these claims so far as possible. The letter suggested that 90% of the claims could be settled by direct negotiations with private claimants. This new offer, though apparently indicating a shift of position on the part of the Soviet Government, served only to prolong the conference four days. The rejection of the Soviet proposals and the closing of the conference came on July 20, through the discovery that they called for *de jure* recognition of the Soviet Republic and for individual negotiations in each case between private claimants and the Soviet Government, with no guarantee of satisfactory settlement of claims.

"The task of the Hague," said Sir Philip Lloyd Greame, the British expert, "was to get a bilateral agreement with detailed provision for guarantees and with assurances to the non-Russian powers that the agreement would be carried out, but the Bolshevist Government insisted on treating with the people and taking matters out of the hands of the government."

"The Hague conference," continued Sir Philip, "brought the Russian Government face to face with actualities as never before. It has shown Russia the willingness of other countries to co-operate with her, while at the same time showing the inevitable character of the economic forces which govern co-operation.

"If Russia decides to pursue the policy foreshadowed by the Russian delegation, she will not merely be entering on a path to bring her back into the community of nations, she will be setting out on the road to the complete restoration of her economic life."

The conference in closing adopted a resolution pledging the powers represented to use their influence with their nationals to prevent the latter from accepting concessions in Russia involving property formerly belonging to foreigners without the consent of these former owners.

POLISH CABINET CRISIS.—After the Ponikowski cabinet in Poland was forced to resign by President Pilsudski on June 2, there was a two months' struggle for supremacy between president and parliament. Two efforts to form a cabinet without a parliamentary majority ended in failure. On July 30, the president gave in to the will of the Nationalist majority in

the Diet by calling on Dr. Nowak, rector of the University of Cracow, to organize a ministry.

The fall of the Ponikowski cabinet ended the work of two able leaders—Michalski, who set Poland on her feet financially; and Foreign Minister Skirmundt, who secured alliances with the Baltic States and with the Little Entente. Poland elects her first constitutional president this autumn.

RECOGNITION OF BALTIC STATES.—A the close of July, the United States Government announced its decision to recognize the Baltic republics formed since the war from former Russian territory. These republics include Lithuania, Latvia and Esthonia. Finland was recognized some months ago.

LEAGUE OF NATIONS

APPROVAL OF MANDATES.—At the special (nineteenth) session of the League of Nations Council which opened in London on July 17, the mandate terms offered by France and Great Britain in the Near East were the special subject for consideration. Both the British mandate for Palestine and the French mandate for Syria were formally approved on July 24, to go into force after settlement of certain questions at issue between France and Italy over the rights of Italian nationals in Syria. Speaking of Arab objections to the Palestine mandate, the Earl of Balfour declared the Arabs were fully protected and would secure liberty undreamed of under Turkish rule.

AMERICAN ATTITUDE TOWARD LEAGUE.—In an exchange of letters in July, with Hamilton Holt, Secretary Hughes defined and defended the policy of the present United States Administration toward the League of Nations. Secretary Hughes justified the separate treaty with Germany, cited the accomplishments of the Washington Conference in the direction of peace, and presented evidence to show that, while protecting American rights, the government had not needlessly delayed the execution of the mandate policy. In a letter dated July 19, Mr. Hughes said in part:

"In your observations you seem to imply that I have been invested with some authority to make this government a member of the League of Nations upon such reservations as I might propose. If you have any such notion, I must ask you to disabuse your mind of it. Entrance into the League of Nations upon any conditions could be accomplished only by treaty, and treaties cannot be made except in the constitutional manner.

"It is idle to propose what it is found cannot be effected. That it is not the way to make progress internationally or otherwise. What I said with respect to the treaty with Germany is applicable.

"Really I cannot see any reason why you should address me in the manner you have chosen, in view of the fact that the atttitude of the administration upon the subject was frankly and definitely stated in President Harding's message to Congress in April, 1921.

The secretary then quoted the President's speech condemning the League because linked with the Versailles Treaty, and declaring our willingness to

enter an "association to promote peace" for all nations without surrender of national sovereignty.

PLAN FOR DISARMAMENT.—On July 4, before the special League Commission on Disarmament, Lord Robert Cecil presented a draft treaty for reduction of armaments.

As a preface to his proposal, the British representative laid down five principles which provide an interesting amendment to the famous Article X of the Covenant of the League. These principles are as follows:

"1. No scheme for reduction of armaments can be effected which is not a general one.

"2. In the present state of the world no government could accept responsibility for a serious reduction of armaments unless it received some satisfactory guarantee of safety for its country.

"3. Such guarantee can be found only in a defensive alliance of all the countries concerned, binding them to come to the assistance of any one of them if attacked. It should be provided that the obligation to come to the assistance of an attacked country should be limited to those countries which belong to the same quarter of the globe.

"4. In cases where for historical, geographical or other reasons a country is in special danger of attack, detailed arrangements should be made beforehand for its defense.

"5. It is understood that all of the above resolutions are conditional on a reduction of armaments to an agreed scale being carried out and on the provision of effective machinery to insure such reduction being made and maintained."

PLEDGE OF MUTUAL SUPPORT

These five resolutions, Lord Robert said, contained the essential element of his plan, but for purposes of elucidation he had drafted them into the form of a treaty which provides that "the high contracting powers hereby agree that if any one of them is attacked all the others will forthwith take such action as they may have agreed upon under Article IV of this treaty. This obligation, however, shall not come into force unless the naval, military and air forces of the party attacked shall have been reduced in accordance with the terms of the treaty."

Article IV reads:

"In the event of any of the high contracting powers regarding itself as menaced by the preparations or action of any other state, whether a party to this treaty or not, it may so inform the secretary general of the League, who shall forthwith summon a meeting of the council of the League, and if the council by not less than a three-fourths majority shall be of the opinion that there is reasonable ground for thinking that said preparations or action do constitute a menace as alleged they shall report such representations to the government creating the menace in respect of such preparations or action as they may think right, and shall direct the permanent Military Commission of the League to submit plans for assistance to be given by the high contracting powers to the party menaced.

"Such plans if approved by three-fourths majority of the council shall become binding on the high contracting powers.

"Neither under this nor any other article of this treaty, however, shall any of the high contracting powers not being a European state be bound to furnish any naval, military or air force in Europe; or not being an American state, in America; or not being an Asiatic state in Asia; or not being an African state, in Africa."

Other articles in the draft provide for the right of inspection by League Commissioners of the armament situation, and a clause is added that nothing in this treaty shall be deemed to diminish the provisions in the covenant for maintaining the peace of the world.

For the present Lord Robert accepted as a compliment to his proposal the disarmament scheme proposed at the last meeting by Lord Esher, which provides that the restriction of land armaments be fixed by ratio, following the naval precedent at Washington. In this scheme Lord Esher fixed the unit for military and air forces at 30,000 men, with co-efficient, as follows: Belgium, 2; Czecho-Slovikia, 3; Denmark, 2; France, 6; Great Britain, 3; Greece, 3; Italy, 4; Jugoslavia, 3; Poland, 4; Rumania, 3; Spain, 3; Switzerland, 2.

Some discussion took place on Lord Robert's scheme and it was then referred to a subcommission to be examined in detail.—*New York Times*, 5 July, 1922.

The Cecil plan was subsequently adopted by the commission for presentation to the League Assembly in September. The Chilean representative on the commission also stated that the whole question of military and naval disarmament would be laid before the Fifth Pan-American Conference at Santiago, next March.

GERMANY NOT TO ENTER LEAGUE.—Following Premier Lloyd George's statement that it was desirable that Germany should enter the League of Nations at the next assembly, Premier Poincaré intimated that Germany's entry should be delayed until she had given, in the language of the League Convenant, "effective guarantees of her sincere intention to observe her international obligations." Later it was said that the British premier would make the admission of Germany a condition to the proposed cancellation of the French debt.

In view of the French attitude, Germany manifested no eagerness to apply for admission, apparently satisfied to remain outside in the company of the United States.

UNITED STATES AND LATIN AMERICA

PHILIPPINE APPEAL FOR INDEPENDENCE.—To the Philippine appeal for independence, supported by every member of both houses of the Philippine Legislature and presented in July, President Harding replied that, with every regard for Philippine achievements, aspirations, and loyalty, the time was "not yet ripe for independence."

In press comments, the McEnery Resolution (accompanying ratification of the peace treaty with Spain) was quoted as evidence of our promise of independence, and the assertion was made that failure to carry out this promise would mean insurrection. It was noted also that aside from their strategic importance, the Philippines contained valuable raw materials including vast quantities of hardwood, and practically all the hemp in the world.

CANADA FOR PERMANENT PEACE TREATY.—On July 12, Premier Mackenzie-King and Minister of Defense Graham of Canada called on Secretary

Hughes in Washington to propose a new treaty between the United States and Canada perpetuating the ideas of the Rush-Bagot Agreement, now 105 years old, and providing for permanent peace without defenses on the United States–Canadian frontier. In Washington the proposal was favorably received and a treaty anticipated.

TO END CONTROL IN DOMINICA.—On July 4, Secretary Hughes issued a statement announcing the conditions under which American military forces and administration would be withdrawn from the Dominican Republic. The statement referred to the proclamation made by Admiral Robinson in June of 1921 which it had been impossible to carry out, and declared that the present plan was based on conferences with Dominican leaders. It provides for: (a) a provisional government which will appoint a cabinet to take over executive duties; (b) concentration of American forces at from one to three points, and maintenance of order by the Dominican National Police; (c) a convention with the United States recognizing the validity of orders and bond issues under the American administration, and enforcement of the Convention of 1907, so long as any bonds of the issues of 1918 and 1922 remain unpaid; (d) withdrawal of American forces after a general election and assumption of office by a constitutional president.

To ascertain whether this plan met the approval of the Dominican people, Mr. Sumner Welles of New York was appointed envoy extraordinary to investigate and report on political conditions in Dominica.

TACNA-ARICA ARBITRATION AGREEMENT.—To end the deadlock in the conference between Chili and Peru over the Tacna-Arica dispute, Secretary Hughes in June made proposals for arbitration. On July 17, it was announced that these proposals were acceptable to both States in the following modified form:

"That the arbitrator decide whether a plebiscite shall be held in the disputed province of Tacna-Arica, as originally provided by the Treaty of Ancon.

"That in case a plebiscite is decided on, the arbitrator shall fix the conditions under which it is to be held.

"That if the decision is against a plebiscite, Chili and Peru will enter into direct negotiations to decide to whom the province belongs, and that in the event these direct negotiations do not result in an agreement within a specified time, both sides will request an exercise of good offices by the United States to aid in a settlement."—*Literary Digest.*

YAP TREATY PROCLAIMED.—On July 17, the United States Government proclaimed the Yap treaty as in full force, and for the first time published the complete text.

The text of the treaty proper provides:

"Subject to the provisions of the present convention, the United States consents to the administration by Japan, pursuant to the aforesaid mandate,

From the Chicago "Tribune."

TACNA AND ARICA

of all the former German islands in the Pacific Ocean lying north of the equator."

Article II provides that the United States and its nationals shall receive all the benefits of the engagements of Japan defined in Articles 3, 4 and 5 of the mandate, notwithstanding the fact that the United States is not a member of the League of Nations. These articles of the mandate prohibit the slave trade or forced labor, prohibit military training of natives otherwise than for internal police purposes and local defense of the territory, and prohibit the establishment of military or naval bases or fortifications.

It is further agreed between the high contracting parties, the treaty sets forth, as follows:

1. Japan shall insure in the islands complete freedom of conscience and the free exercise of all forms of worship which are consonant with public order and morality; American missionaries of all such religions shall be free to enter the islands and to travel and reside therein, to acquire and possess property, to erect religious buildings and to open schools throughout the islands; it being understood, however, that Japan shall have the right to exercise such control as may be necessary for the maintenance of public order and good government and to take all measures required for such control.

2. Vested American property rights in the mandated islands shall be respected and in no way impaired;

3. Existing treaties between the United States and Japan shall be applicable to the mandated islands;

4. Japan will address to the United States a duplicate of the annual report on the administration of the mandate to be made by Japan to the council of the League of Nations;

5. Nothing contained in the present convention shall be affected by any modification which may be made in the terms of the mandate as recited in the convention unless such modification shall have been expressly asented to by the United States.

Article III provides:

The United States and its nationals shall have free access to the island of Yap on a footing of entire equality with Japan or any other nation and their respective nationals in all that relates to the landing and operation of the existing Yap-Guam cable, or of any cable which may hereafter be laid or operated by the United States or by its nationals connecting with the Island of Yap.

The rights and privileges embraced by the preceding paragraph shall also be accorded to the government of the United States and its nationals with respect to radio telegraphic communication; provided, however, that so long as the Government of Japan shall maintain on the Island of Yap an adequate radio-telegraphic station co-operating effectively with the cables and with no other radio stations on ships or on shore, without discriminatory exactions or preferences, the exercise of the right to establish radio-telegraphic stations on the island by the United States or its nationals shall be suspended.

Article IV declares that in connection with the rights embraced by Article III specific rights, privileges and exemptions, in so far as they relate to electrical communications, shall be enjoyed in the Island of Yap by the United States and its nationals.

No censorship or supervision is to be exercised over cable or radio messages or operations.

Nationals of the United States are to have complete freedom of entry and exit in the islands for their persons and property.—*New York Times*, 18 July, 1922.

FAR EAST

CONDITIONS IN SOUTH CHINA.—On July 15, it was reported that four of the naval vessels controlled by Sun Yat-sen at Canton had deserted, leaving only two cruisers, two destroyers, and two transports under his orders. According to a despatch of August 2, President Sun's long expected troops had returned from the North and were defeated in an attack on General Chen Chiung-ming's lines, 130 miles north of Canton.

In Manchuria the defeated General Chang Tso-lin had made new alliances with the Anfu leader, Tuan Chi-jui, and with Sun Yat-sen, and had forced General Wu to resume active military operations. The Chinese parliament met on August 1, with members in attendance sufficient for a quorum. Parliament and President Li Yuan-hung were reported in agreement over the adoption of a permanent constitution for China.

WARNING FROM JAPAN TO CHINA.—Early in July, the Japanese government issued a warning to China that unless the Chinese Government took adequate steps to prevent the recurrence of outrages against Japanese in Manchuria, Japan would despatch troops from Korea and assume responsibility for the protection of its nationals. Bandits, on June 28, raided

the Manchurian town of Tou-tae-kon, near the Korean border, set fire to the Japanese consulate, and killed two Japanese, one Korean, and three Chinese. This, according to the Japanese statement, was the third affair of this kind since September, 1920.

JAPANESE POLICY.—Mr. Isaac F. Marcosson, American correspondent in the Far East, upon his return in July, expressed the view in the *New York Times*, that Japan had actually changed her policy toward China from aggressive penetration to the cultivation of friendly feeling. He declared that the Japanese economic situation made it impossible for her to continue her aggressive policy or wage war on a modern scale. Retrenchment was essential to avoid national bankruptcy.

Regarding China, he believed General Wu Pei-fu to be an honest and strong leader, but "unification of China will be a slow process because of endless jealousy and corruption."

REVIEW OF BOOKS

THE FLIGHT OF THE "GOEBEN" AND "BRESLAU," by Admiral Sir Berkely Milne, Bart., G. C. V. O., K. C. B. London. Eveleigh Nash Co., Ltd., 1921.

Early in the war referring to the conference in Paris between Lord Kitchener and General French, M. Millerand said, *"il ne faut pas encombrer nos generaux de suggestions."* That the British Admiralty held a contrary opinion is apparent in all the naval campaigns of the war beginning with the *Goeben* affair—where to use Sir Julian Corbett's expression the admirals were "bewildered" by instructions from London. No one can read Admiral Milne's presentation of the case without being impressed with the fact that the Admiralty and not the commander-in-chief directed the *Goeben* campaign, which had such unhappy results, but for which the admiral was responsible.

Admiral Milne's account of what he calls the "flight" of the German ships is written from his viewpoint as commander-in-chief, and is really his Apologia. The story is told in the simple, straight-forward language of the quarter deck, with courteous avoidance, even by implication, of criticism of any one under his command, but without attempt to conceal his irritation with Sir Julian Corbett, the official historian of the war, and with the Admiralty for permitting the publication of what he deems inaccuracies, in Sir Julian's narrative,[1] notwithstanding their disclaimer of responsibility for the author's opinions.

After the *Goeben* affair stories were current in the press, that the Germans had outwitted the British naval officers by sending out false messages in admiralty code, and there was another story that when the German ships left Messina for the dash to Constantinople, the flagship's band was left ashore to deceive passing ships by the music. These stories lack verification, but are worth mentioning, especially the first, in view of what Admiral Milne calls the "mistaken" telegram which he received on August 9.

In 1916 and again in 1919 the question of responsibility for the escape of the *Goeben* was brought up in the House of Commons, but it was shown that the "conduct and dispositions" of Admiral Milne had been approved by the Admiralty. The commander of the First Cruiser Squadron was, on the recommendation of a Court of Inquiry, brought to trial by General Court Martial, and was "fully and honorably acquitted." When Admiral Milne retired from active service in 1919, the Admiralty

[1] Naval Operations, Vol. I, Chapter III.

published a statement completely exonerating him from all blame. Official vindication can go no farther.

It will not detract from the interest of Admiral Milne's book to outline his account of this momentous naval adventure with its far-reaching results.

When the commander-in-chief was informed by the Admiralty that the *Goeben* was his paramount objective and that he was to shadow her wherever she went, he sent the First Cruiser Squadron to watch the Straits of Otranto, established a patrol in Malta Channel, and dispatched a swift light cruiser to examine the Straits of Messina. It is well to bear in mind that both the Admiralty and commander-in-chief were convinced that the Germans would try to get into the Atlantic Ocean. No one apparently considered the Dardanelles as a probable or possible refuge.

In addition to his main task in connection with the *Goeben*, Admiral Milne was instructed to look out for the Austrian fleet and to afford protection to the French transports from Algeria. He was ordered to remain at Malta himself; he was cautioned not to engage a superior force, and later when Italy announced her neutrality he was directed to keep his ships out of the six-mile limit of her coast.

Although he was continuously receiving orders and instructions from the Admiralty, his greatest handicap was lack of information. The Germans apparently used the Italian wireless freely, but the British commander-in-chief could not, or at least did not, receive any information from the British agent at Messina until after vexatious delays, and he had difficulty in establishing wireless communication with the French admiral.

The German division left the Adriatic, coaled at Brindisi, and proceeded to Messina without the movement being known to the commander-in-chief until much later. As a matter of fact the ships were not definitely located by the British until the *Indomitable* and *Inflexible* ran into them off the east coast of Sicily in the forenoon of August 4.

The British ships were on their way at high speed to Gibraltar to assist in guarding the Straits, and the Germans who had coaled at Messina had just bombarded the Algerian coast towns of Bona and Phillipville. The Germans were standing to the eastward and edged off to the northward when they sighted the British. The latter closed in, and the ships passed each other on opposite courses at a distance of 8,000 yards, without saluting but with guns trained fore and aft. The stage was set for a mighty fine sea fight, one that would have had a unique place in history, but at the moment war was not declared—fifteen hours later[3] the meeting would have had a different ending! On cannot help wondering however what would have been the result if the British ships, disregarding the formality of a declaration of war, à la Japanese, had sunk the Germans then and there. But as O. Henry remarks, what's the use!

[3] At fifteen minutes past one, August 5, on the night of August 4-5, I received the order to commence hostilities against Germany. Admiral Milne, (p. 71).

Under the circumstances there was then nothing for Captain Kennedy in the *Indomitable* to do but to swing around and "shadow," but as the German ships had the heels of the British, the latter were unable to keep up, and the Germans made for Messina where they arrived next morning. It would seem that the fox was caught. But after coaling from German colliers, and at 5 P. M., August 6, Admiral Souchon began his memorable dash for Constantinople, accompanied by the *Breslau*. The German armed auxiliary *General* sailed with them, but took a different route, running to the southward along the coast of Sicily and arrived at Smyrna the ninth of August without having been seen.

After the British ships lost sight of the *Goeben* the commander-in-chief naturally assumed that she would make for Messina, and accordingly the *Gloucester* was detailed to watch the southern approaches of the Straits, while with two battle cruisers and two light cruisers he patrolled on a north and south line north of Bizerta. At this time the *Indomitable* was coaling at Bizerta and the First Cruiser Squadron and destroyers were off Cephelonia.

This disposition of the British Forces was subsequently approved by the Admiralty. However, as the commander-in-chief had known since August 4 that the French admiral was at Bizerta, and that on the night of August 6-7 the latter had offered him a squadron of cruisers, it seems strange that he himself did not take up a central position near Malta, where he would have been in the best position to support either Troubridge to the eastward or his French colleague to the westward, as occasion might acquire. It was certain that the combined French and British forces thoroughly protected the westward area if the Germans attempted to break into the Atlantic; the weak part of the net was to the eastward. And it happened, at 6 P. M., August 6, the alert *Gloucester* sighted the *Goeben*, followed by the *Breslau* coming down through the Straits. Had the commander-in-chief been near Malta, which is about 120 miles from Messina, the Germans must have been inevitably intercepted and caught between him and the First Cruiser Squadron. As it was when the admiral received the *Gloucester's* report about 11 P. M. that the Germans were again at sea, he himself in the *Inflexible* was off the northeast point of Sicily, 180 miles from the northern entrance of the Straits; even if he had disregarded the Admiralty's order to keep out of territorial waters of Italy (which was cancelled four hours later) and pursued through the Straits it would have been a useless stern chase.

So the commander-in-chief returned around the west coast of Sicily and arrived at Malta with the *Inflexible* and *Indefatigable*, where at noon on Friday, August 7, later he was joined by the *Indomitable*, and these ships sailed thence to the eastward early on August 8, at a speed of about ten or twelve knots, the squadron having been detained several hours by boiler repairs in the *Indomitable*.

When the *Gloucester*, lying ten miles off Taormina, sighted the *Goeben* standing out around the Calabrian coast, followed by the *Breslau* astern,

Captain Kelly lost no time. Skillfully working his way inshore of the Germans deliberately and gallantly passing within gun range of the *Goeben*, he put them in the moonlight, while he hugged the shadows of the shore line. Once the *Breslau* tried to pinch him inshore, and once she tried to provoke him to action by crossing his bows and passing within 4,000 yards of him, but with splendid self-control he reserved his fire, and held on to the *Goeben*. Shortly afterwards the *Breslau* disappeared to the southward and eastward, presumably to scout ahead. At 11 P. M. Admiral Souchon turned to the southward and eastward and Captain Kelly reported the change of course, but unfortunately Troubridge thought it was a blind, and held on to his leisurely patrol to the northward to watch the entrance to the Adriatic, should the *Goeben* attempt to enter the Straits of Otranto. An hour later, becoming convinced that the change to the southward was not a feint, the rear admiral turned to the southward at midnight (6-7) to intercept the *Goeben* which at that moment was only 120 miles away. He was on interior lines and converging, and as he must have known continuously from Captain Kelly the exact position of the Germans, it is not clear why he did not hold on, make a torpedo attack before daylight, and follow it up if necessary with a ship action. His eight destroyers well handled would have easily and quickly accounted for a fleeing ship at night whose position was accurately known. In the mêlée of Heligoland, August 28, the destroyers made history even when short of coal and ammunition. However the commander of the First Cruiser Squadron decided that the *Goeben* was a superior force—as she was if destroyers are excluded from the count—and as his orders forbade engagement with a superior force, about four o'clock (August 7) he hauled off, and proceeded to Zante, where he anchored at 10 A. M., the *Goeben* at that time passing only 42 miles distant, still trailed by the gallant *Gloucester*. The *Breslau* rejoined her consort at 10:30 A. M.

About 1 P. M. in order to check the *Goucester*, the *Breslau* began to drop astern, and then Captain Kelly decided in turn to bring her to action for the purpose of checking the *Goeben*, and giving the First Cruiser Squadron time to catch up, not knowing the latter had abandoned the chase, "or to be more exact, that he had abandoned his intention of intercepting them and bringing them to action." To this end the *Gloucester* turned to the northward and eastward and brought the *Breslau* on his starboard quarter and opened fire. As he anticipated the *Goeben* turned sixteen points to drive off the *Gloucester*, but after the two small ships had exchanged several shots, and the *Goeben* had fired several at long range, she resumed her course to the southeastward followed by the *Breslau*, and again by the *Gloucester*, until off Cape Matapan when the *Gloucester* at 4:40 P. M. was recalled by the commander-in-chief, and the Germans passed through Cervi Channel into the Aegean Sea.

The commander-in-chief had previously ordered Captain Kelly to drop astern and avoid action, but according to Corbett, "Captain Kelly considered these orders 'permissive,' not mandatory, and held on and did

just what he was told not to do. There is a fine Nelsonian touch in this, worthy of emulation."

For his splendid conduct in this affair Captain Kelly was decorated with the Order of Companion of the Bath.

Now occurred an incident which completely upset the plans of the commander-in-chief. In the forenoon (8th) he received a radio to begin hostilities against Austria. He immediately headed up to the northward and eastward to effect a rendezvous with the rear admiral off the mouth of the Adriatic, but at 2 P. M. he received another radio negativing the first one. He was now a bit suspicious, and asked confirmation of the second message, and this was received about six o'clock. At noon the next day he received definite word from the Admiralty that England was not at war with Austria, and to continue the pursuit of the *Goeben*.

In justice to the commander-in-chief it must be recorded that the destroyers were short of coal, and that the colliers sent by him did not reach the commander of the First Cruiser Squadron until August 8. The failure to coal the destroyers was largely responsible for the escape of the Germans for they could neither attack nor search, and as attendants of the Cruiser Squadron were entirely useless without coal. Admiral Milne does not discuss the responsibility for this fatal neglect. His only comment is "the collier *Vesuvio* had already (2 P. M., August 8) arrived at Port Vathe, Ithaca, unknown to the rear admiral." Three more colliers arrived the next day but then it was too late.

At the time the commander-in-chief resumed his search for the *Goeben*, that ship was coaling in the island of Denusa about 350 miles distant. He proceeded down the coast towards Cape Matapan with the three battle cruisers and the *Weymouth*, speed ten knots. He had no destroyers with which to scout and search and only one light cruiser, the others not having come up. As he remarks, "to search for ships of superior speed among the islands of the Aegean Sea with battle cruisers alone would have been an insane proceeding."

It is futile to follow the battle cruisers farther. No one dreamed that Constantinople was the goal of the Germans. The commander-in-cheif guessed Salonika, some Greek port, Alexandria, or even a turn westward to Gibraltar. He was deceived also by the apparent direction of the *Goeben's* wireless, as well as that of the *General*, which ship had made a wide sweep, and reached Smyrna without molestation.

While cruising and searching on a radius of sixty miles off Cape Malea, the commander-in-chief received at 10:30 A. M. August 11, the disconcerting telegram from Malta that the *Goeben* and *Breslau* had entered the Dardanelles at nine o'clock the night before. The fox had escaped.

Opinions will vary as to the conduct of this brief but momentous campaign in the Mediterranean, but there can be no question as to the skill and courage of Admiral Souchon. The escape of his two ships from the enemy's force of twenty-five after a search and pursuit which lasted

ten days and covered several thousand miles, must take high rank in naval history.

The real importance, however, of this achievement was less naval than diplomatic, for the appearance of the two ships in the Bosphorus after their spectacular escape from the British Fleet served to hasten the downfall of Russia, and to throw Turkey into the arms of the German Powers, and thus prolong the war.

ALBERT GLEAVES.

METEOROLOGY: AN INTRODUCTORY TREATISE, by A. E. M. Geddes, O. B. E., M.A., D.Sc., New York (D. Van Nostrand Company), 1921. 8°, Pp. XX+390, Pl. 21, Figs. 103. Price, $6.00.

Many of the recent advances in the science of Meteorology have resulted from observations far above the surface of the earth in the higher regions of the atmosphere, but it is not alone by such observations that meteorology has progressed; sometimes, results obtained in the laboratory of the experimenter or in the study-chamber of the investigator have yielded more than the most distant and perilous ascents into the atmosphere, and it is likewise when the settled knowledge of the subject has been summed up to form a new starting point, as it has been in the present volume in a manner unexcelled in its suitability for the general reader, as well as to those concerned in the applications of meteorology in commerce and weather forecasting and in the arts and industries. For these, the whole range of the subject has been covered, unfolding each part from its historical background and devoting the greatest attention to modern methods, and instruments, and results. There are chapters on the composition of the atmosphere at different heights and the distribution of dust particles; on radiation; on temperature, including the temperature of the sea; on the theory of the winds, especially the general circulation of the atmosphere, the land and sea breezes, and mountain winds; on the water vapor of the atmosphere, embracing accounts of clouds accompanied by fine illustrations, and of fogs attended with the results of the most authentative investigations; on the minor circulations of the atmosphere including the cyclones of the temperate and tropical zones, tornadoes, waterspouts, and line squalls; on the free atmosphere, describing its divisions into troposphere and stratosphere and the correlation between pressure and temperature at different heights, and their relation to the "structure of the atmosphere"; on atmospheric electricity; on meteorological optics; on the acoustical properties of the atmosphere; and on weather forecasting and climate. Illustrative views and diagrams of high quality abound throughout the whole of this well arranged and clearly written book, and an excellent index is provided.

The author is Lecturer in Natural Philosophy in the University of Aberdeen, and thus has been in close association with the Aberdeen

Meteorological Observatory of the British Meteorological Service, which is under the supervision of the Professor of Natural Philosophy of the University. This circumstance explains the large extent to which the materials employed to illustrate principles have been drawn from British meteorological sources. Owing to his relations as a student and with a view of stimulating research, it might almost have been expected that the author would have addressed himself more fully to a clear exposition of the state of knowledge with reference to the unsolved problems of meteorology, like the general circulation of the atmosphere, the cause of the daily variation of pressure, the origin of the stratosphere and the phenomenon of finding the coldest air of the free atmosphere over the geographical equator.

G. L. LITTLEHALES.

THE PACIFIC TRIANGLE, Sidney Greenbie. The Century Company. Price $4.00.

The eternal triangle of love—the two striving in competition for the one—is the triangle of races in this interesting volume: races impelled by the impulse of interest, prejudice, and passion. The blushing object of these angular attentions, or, may we not say, the quarry of the international *chassez-la-femme,* is the islander of the mighty Pacific.

The author was adroit in his selection of a title, no doubt estimating, on the principle of *mal y pense,* that the frivolous would be caught by the suggestion of a fancied maze of amorous intrigue, while the serious would interpret the triangle as profoundly significant of the variance of the tremendous problem of our now most interesting theater.

Neither the serious nor the frivolous need be disappointed: the author writes of his own travels and was blind neither to the tropical "beauty unadorned" nor to the great philosophical and practical truths that he read as he ran in the cosmopolitan range of his Olympian vision.

The gentle reader, then, is served a substantial meal of international relations all adorned and sweetened and flavored to taste with delicious sprigs and sprays and side dishes of "salacious joys" and love—almost lecherous side dishes. And this is as it should be, for why should not our serious studies and worries be garlanded by the indigenous foliage of their *habitat?* And haven't we always been taught, by the literature of the Pacific, that we should unbend our Puritanical backs and limber up our so-called morals a bit when we approach the tricky 180th meridian? Long before we reach so far into the Pacific, the most prudish of us is well acquainted with the *hula* and *luau* and does not blink an eyelash at a shapely bronzed nudity. And this is as it should be, too—softness, simplicity, genuineness, generosity, back to Nature! It is the influence of the evanescent Polynesian.

And so Mr. Greenbie tells the story of the heliolithic Polynesian—of his centuries-long[4] (or perhaps millenium-long) voyage, or voyages, to migrate from "over Kim's way," across the chains of islands that now

make Melanesia and Polynesia: a migratory wave so slow in rolling in that it picked up all sorts of flotsam of other nations and races and tribes.

"And the soft sweet flesh of young maidens began, generation after generation, to be covered with the tattooings of time, the records of the number of times the race had been reborn. So while the nakedness of youth was being clothed, mind after mind stored up unforgetable tales of exploit and of passion, till fancy sang with triumph over things transitory, and tawny men felt that never would they have to wander more." Thus the *Triangle* tells us about the Polynesian and whence he came, except that no mention is made of the late alleged discovery of the pre-Inca dash into the Pacific blood pot.

The author thinks the missionaries have overestimated "such minor conventions as wearing clothes and monogamy." As a matter of fact the mere matter of marriage has been both a remarkable leveller and a merciless differentiator of Pacific peoples to whom came, from widely separated regions, men whose notions of man's relations to women were widely divergent. And the clothes of the "devout disciple," yea even the heathenish *holoku*, or incondite "Mother-Hubbard," that the Christian missionary in Hawaii inconsiderately forced over the lithe limbs of gamboling nymphs (that their gambols might be less diverting in the sight of Christian males) was a deadening blight upon the native's physique as it was a vulgar blot upon Nature's artistry. They died of consumption.

In Australia, the rabbit was a pest; his enemy the ferrit was imported, increased and multiplied until he became a pest; then the cat was encouraged to increase and his hosts were turned loose upon the ferrit; the cat went wild. And now one of Australia's "serious problems" (the world is full of problems!) is the wild-cat pest.

Things increase in the warm Pacific—except the natives under Christian influence, who languish under competition with Americans, English, and Asiatics who absorb the Polynesian as the latter absorbed those whom they found innocently and happily cannibalizing life away when they came a-conquering ages ago.

We thoughtless or careless ones think of the tropics as full of breadfruit and an abundance of other foods ready to the native's hand without labor. While it is true that tropical fruits are rich in vitamines peculiarly suited for sustenance of so spirited a race, it is also true that there is not enough without labor, and the fear of famine "and the insecurity of life have dampened the joys of many a wild man, and the pressure of population has only too frequently resulted in infanticide and cannibalism." There are no indigenous animals anywhere in the Pacific islands. In New Zealand there are a few birds and a giant moa.

We learn that the Fijians are more remote in kinship to us than are the Samoans, Hawaiians, or even the Tongeans, for the Fijian is not Polynesian but Melanesian, a negroid sub-branch of Polynesians, while the Polynesian has his relationship to us though his Indian Aryan ancestry. The Fijians are patient and apathetic to life. Their *malua* is equivalent to the well-known Spanish *mañana*. The Fijian lets the Indian coolie do the

work. The Fijians are submerged by Hindus, Telugus, Madrasis, Sardars, and Hindustanis.

Suva is the eye of Fiji and of the needle of the Pacific, with nothing to sew under its stupefying sun. And yet the Fijis are among the most salubrious of South Sea islands. The traveler who hopes he sees progress in the ubiquity of corrugated iron roofing is reminded that the old thatch had to be renewed annually, the iron perhaps once in a generation; hence the iron age contributes in a decisive way to the degeneracy of idleness. The Fijians long have been recognized as excellent carpenters—a craft that passes down from generation to generation in families. Their shipbuilding always has been far superior to that of the neighboring Tongeans.

Kava is the native drink of Fiji. Its manufacture used to be solely the chief's daughter's task who ground the *ara* root with her teeth and mixed it with water, but that method has been Volsteaded out. It now must be crushed in the *tonoa* (mortar) by a Hindu. *Kava* is drunk from the half of a cocoanut shell and is bitter but refreshing.

There is not much apparent joy in Fiji. The male is shy and is committed, body and soul, to the training of his bushy hair which is bleached with a mixture of burnt coral and water. The sexes seldom meet in social intercourse—no flirtations; neither kiss nor any compensating substitute.

Fijians shine in their music; its weird and vigorous composition is more fascinating than the passionate voluptuous tunes and dances of the Samoans and Hawaiians, more artistic than European music. Fijian choral voices are the loveliest in the world.

Samoa, too, has its music, its *lali*-players as in Fiji, the *lali* being the section of a tree trunk which once made the war-alarm or call to cannibal feasts, though now it invites the faithful to Christian prayer at the Davuilevu Mission. They also have the drink from the *ava* root.

Samoa is more occidental than Fiji. There is the *talofa*, or meeting kiss, and the *tofa*, or parting kiss—with cheek to cheek at an angle. Bread-fruit trees grow in bi-sexual pairs, the female bearing the fruit.

Vailima, Stevenson's home, is now the residence of the governor-general at Apia. The natives remember the great man affectionately as *Tusitala*, the tale-teller.

As for other artists, there are Melba and Annette Kellerman, near by in Australia. Annette came to her swimming naturally for it is said that Sydneyites are the most amphibious folk in the world, but it is doubtful if this estimate includes the Hawaiians.

Australian cities have fifty-one per cent of the commonwealth's population, which means that the hinterland is somewhat neglected.

In Melbourne, Greenbie's eyes roamed again and found "Victorian belles, tall, graceful, russet-skinned, plump but not flabby, moved with a fine air of self-reliance. On closer acquaintance I found that these girls were not silent and opinionless as were most of the New Zealand girls." What's more the men allowed them to express their opinions: good companionship between the sexes; not so in New Zealand. The

people were a joy to look at, says the author. Cockney is prevalent in unguarded moments.

"White Australia" is the keynote of all Australian policies and Labor is at the bottom of that. The country's greatest difficulty is insufficient population, with only four and half millions in about the same area that holds 110 million Americans. She has a vast region not likely to be touched by labor for generations. "Australia uses the same argument against outsiders coming in as does America in regions already well developed." Australian "Labor" opposes not only Japanese but any cheap labor immigration. Legislation excludes from "immigration into the commonwealth . . . . any person who fails to pass the dictation test; that is to say, who, when an officer dictates to him not less than fifty words in any prescribed language in the presence of the officer" fails to pass in the judgment of the immigration officer who may spring any language on the candidate—Spanish on a Jap, for example. "The law has kept Australia white but with pallor rather than purity."

The failure of conscription was due to the "white" policy. The question in politics was a great strain upon domestic tranquility. The pro-conscriptionists argued that they must assure the Allied victory so that Prussia or her future ally might not swoop down on Australia. The opponents argued, "Let us keep our men at home to protect us against the possible peril." The latter pictured an invasion as soon as Australians might be sent to Europe, and pointed to Europe's importation of coolie labor. One member of Parliament was heavily fined for stating his fears in terms of Japan.

"That mere excessive breeding gives a nation a right to invade other lands is a principle that no decent-minded man could tolerate for a moment."

As a memento of Australia's birth as a "convict colony," a tennis club at Subiaco, suburb of Perth, will not accept as a member anyone whose grandfather was born in Australia "lest that ignoble ancestor should have passed on some of the taint." But of course "convict colony" is now no more applicable to Australia than to Virginia, for the last convict was brought out in 1840.

Australia is exclusive in discrimination against English workmen and Asiatic and colored people, while New Zealanders are anathema.

In New Zealand, an Australian cannot get a job. Our author traces the reason for the psychological homogeneity in the British antipodes, and explains why the New Zealander is the exact *replica* of the Englishman, while the Australian, especially of the east coast, is as little of an Englishman as possible. In times gone by, it has been the case of New Zealand and Australia that clung to the mother country instead of the reverse.

The natural beauty of New Zealand rivals that of any other country of its size except Japan. Its three principal cities are quite different in character though of about the same size, boasting some 80,000 inhabitants

each. New Zealand youngsters have free railway passes for journeys to school.

It might be said that the people have distinguished themselves in their treatment of the Maoris for no race on earth has been given greater opportunity to make good, but the *tui*, the bell bird, whose song is sweeter than that "blithe spirit" immortalized by Shelley's ode, sings of the Australoid's failure in the race for which he was not equipped constitutionally. The savage who was educated and became a Shakespearean scholar is the exception.

But if "Labor" has kept the antipodes conservative in progress, that is not so in reference to Hong Kong, whose population, in an area of twenty-nine square miles, is one tenth of that of Australia's millions of square miles. And the English found Hong Kong a barren island when it was demanded from China seventy-five years ago.

Speaking of the ease with which one white policeman in Hong Kong can control a large throng of Chinese, the *Triangle* says: "Thus China enjoys a oneness like that of water. Easily separated, lightly invaded, rapidly united, her masses flow on together when directed into any channel, and it matters little where or why. . . . Yet, what nation or race in the world has maintained such indivisibility against so much separation!"

Perhaps Chinamen are living too much in mind of old Laotsze, their noble philosopher of the seventh century B.C., whose real name was *Li* (which stands for *plum tree*). He is said to have been born old with a white beard. They called him Aged-Boy as he went about wildly preaching philosophy diametrically opposed to Confucianism.

All these observations, and many more, represent two sides of the Triangle while the third side is found in our own Japanese relations. Mr. Greenbie's estimate is that Japan has no basis for her appeal that her people be given free entry the world over because Japan herself does not:

(1) permit the free entry of alien labor; or
(2) permit the ready purchase by aliens of agricultural land; or
(3) make the naturalization of aliens easy; or
(4) permit the denaturalization of her people abroad.

The author draws an interesting comparison in citing the great fear that Japanese residents of the Hawaiian Islands have of the Kilauea fire-pit where heathen Hawaiians enthroned *Pele*, the goddess of fire, and recalling that the beautiful Princess Kapiolani, enlightened by American missionaries, approached the brink of the awful pit and bravely defied her ancestral deity. Hence the Hawaiians are more nearly removed from the slough of superstition than are the Japanese.

We are told, however, that affairs appeared to be moving so swiftly in the land of the last great autocracy that the author confidently expected to see a revolution, or at least universal manhood suffrage, during the previous year, 1920.

Truly the ways of the Orient are intricate for even the expert student: our author admits his own bewilderment and his own failure to discover

the great issue in the mass of pleading—the solution of the political functions of the triangle—the discovery of the kind of *Palladium* that should be erected for China.

As to the Anglo-Japanese Treaty, it is said that Japanese public opinion was about equally divided between those that feared the treaty would be abrogated and those that feared it would be renewed.

Then appears John W. Lamont, the efficient protagonist for the Consortium, when Japan is opposing that co-parnership in finance, unless she can hang upon it a certain recognition of her "special interests" or alleged diplomatic squatter's rights in Mongolia and Manchuria. Lamont proved to be an adroit diplomat for it seems that it suddenly dawned upon Japan that the joke might be on her if she withheld her own participation in the Corsortium which she came to suspect might harbor tremendous possibilities for her own aggrandizement through industrial developments that might work such wonders as, for example, make quite available that choice Shansi coal field, said to be much superior to the finest of Pennsylvania anthracites both with respect to quantity and accessibility. (Shansi has enough to meet the world's demands for about a millenium.) One thing more, Japan has been assured that she "need have no reason to apprehend that the Consortium would direct any activities affecting the security of the economic life and national defenses of Japan." Lamont found Japan much more nearly isolated socially than geographically.

The Consortium is made possible by the acquiescence of the American, British, French, and Japanese banking groups. It only awaits the establishment of peace between North and South China to begin business under the partnership.

Now, we are to learn just what the Consortium, so long shrouded in mystery, really is. Unionized finance—closed shop in banking. It eliminates competition which is an advantage accruing to the bankers, probably at the expense of the buyer of credit, China.

The great obvious virtues of the Consortium are: (1) it binds the great powers together in mutual interests which presumably should have some tendency to keep such powers from warring; (2) it makes such powers mutually interested in, and responsible for, Chinese progress, just as the members of a holding corporation are interested in the solvency of their subsidiary corporations; (3) its activities, it is agreed, will be confined to administrative finance, that is to say, it will not undertake such private enterprises as banking, manufacturing or commerce, but will devote itself entirely to construction of railroads, of which China has only 6,500 miles and needs 100.000 miles, to laying highways, and to reorganization of the currency. It will make loans only to federal and provincial governments.

This interesting book closes with the well-known plea for better international understanding as the panacea for war. But does not that do violence to historical precedent, for is not war invariably the result of intimacy? And when have nations quite strange, one to the other, gone

to war? It has been the neighborly "warring and learning tribes" of Europe that have brought the world its most amazing culture and civilization.

G. C. THORPE.

ABOUT THE PACIFIC

There are 70,000,000 people within the bosom of the Pacific and more than half a billion in the countries that touch its shores.

A Polynesian reached polar ice in the north seas about 450 A.D., going in his big canoe.

The Hawaiians are accused of having eaten Captain Cook and one old man used to exhibit himself to tourists as the human reliquary of Cook's left big toe.

The flat bookworms of the Fiji Islands eat great holes into (or *in*) Suva's library.

Fijian outrigger canoes with mat sails are known as *takias*.

Taboos, the Polynesian fan tells us, are merely the parents of atrophied occidental conventions.

Savii is the largest island of the Samoan group. Its Mua Peak emits a sluggish smoke.

Thursday Island is one of the smallest of the Prince of Wales group in the South Seas. It is north of Cape York Peninsula in Torres Straits.

Ratu Joni Mandraiwiwi, the most powerful living Fijian chief, lords it over 80,000 subjects.

The most southerly hotel in the world is at Bluff, New Zealand.

In Samoa the loin cloth is known as the *sulu;* in fact, that designation is correct in many groups of the South Sea Islands.

One drinks *kava*, *yagona* or *buza* in Fiji. Any one of them accelerates the reactions. Kava is bitter.

The *eta* in Japan is an outcast class. The *eta* is the specialist in dead things. He is not only the butcher but he hauls away the dead horse or carries off the dead cat. But the *eta* also sells the flowers for decorating the *tokonoma*, the most honorable place in the home. And yet the *eta's* touch profanes the lowest classes.

The kiss is unknown in Japan, nor have the Japanese any substitute therefor.

The *geta* is the Japanese sabot.

The Fijians have contributed little romance to the Pacific compared with the Samoans and Marquesans.